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EDISON ELECTRIC INSTITUTE BULLETIN

DECEMBER, 1939

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EDISON ELECTRIC INSTITUTE

THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

DURING THE MONTH OF OCTOBER

	1939	1938	%
	SOURCE OF ENERGY		
Kilowatthours Generated (Net)			
By Fuel Burning Plants	8,447,471,000	6,622,926,000	+27.5
By Water Power	2,759,342,000	3,074,169,000	−10.2
Total Generation	11,206,813,000	9,697,095,000	+15.6
Net Purchases			
From "Other Sources"	346,271,000	334,114,000	+ 3.6
Net International Imports	87,677,000	111,341,000	−21.2
Total Purchased Power	433,948,000	445,455,000	− 2.6
Total Input	**11,640,761,000**	**10,142,550,000**	**+14.8**
	DISPOSAL OF ENERGY		
Total Sales to Ultimate Customers	**9,640,031,000**	**8,335,462,000**	**+15.7**
Company Use, Etc.			
Used in Electric Railway Department	25,074,000	30,308,000	−17.3
Used in Electric and Other Departments	121,366,000	133,346,000	− 9.0
Furnished Free or Exchanged in Kind	5,967,000	3,553,000	.....
Total Company Use, Etc.	152,407,000	167,207,000	− 8.9
Total Energy Accounted For	**9,792,438,000**	**8,502,669,000**	**+15.2**
Losses and Unaccounted For	1,848,323,000	1,639,881,000	+12.7
Total Output (To Check Above **"Input"**)	**11,640,761,000**	**10,142,550,000**	**+14.8**
	CLASSIFICATION OF KILOWATTHOUR SALES		
Residential or Domestic	1,782,438,000	1,644,381,000	+ 8.4
Rural (Distinct Rural Rates Only)	(Allocated to	Other Classes)	.....
Commercial and Industrial			
Small Light and Power (Retail)	1,732,086,000	1,568,493,000	+10.4
Large Light and Power (Wholesale)	5,218,549,000	4,268,076,000	+22.3
Public Street and Highway Lighting	169,001,000	158,142,000	+ 6.9
Other Public Authorities	228,879,000	216,352,000	+ 5.8
Street and Interurban Railways	318,160,000	318,977,000	− 0.3
Electrified Steam Railroads	161,264,000	130,307,000	+23.8
Interdepartmental	29,654,000	30,734,000	− 3.5
Sales to Ultimate Customers	**9,640,031,000**	**8,335,462,000**	**+15.7**
	ESTIMATED REVENUE		
Revenue from Ultimate Customers	$199,499,300	$186,048,000	+ 7.2
Other Electric Revenue	2,210,100	2,275,000	− 2.9
Total Revenue	$201,709,400	$188,323,000	+ 7.1
	RESIDENTIAL OR DOMESTIC ELECTRIC SERVICE— 12 MONTHS ENDED OCTOBER 31st		
Kilowatthours per Customer	890	844	+ 5.5
Average Annual Bill	$36.49	$35.93	+ 1.6
Revenue per Kilowatthour	4.10¢	4.26¢	− 3.8

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 7 DECEMBER, 1939 No. 12

The Frontier

By C. W. Kellogg
President, Edison Electric Institute

(A talk before the Indiana Electric Association)

AFTER many centuries of education and practise in self-control, the majority of civilized mankind has approximated to compliance with the Ten Commandments. This majority compliance has not however prevented the civilized part of the human race from indulging in other errors not specifically prohibited in the great Decalogue. One of the most devastating of these is self-pity, which might be described as the besetting sin of our modern civilization in this country.

The great trouble with self-pity is that it tends to accentuate rather than to cure the ills that cause it. Until this evil became so prevalent among us, it was the practise of people, when they got into trouble, to bestir themselves to find ways and means to extricate themselves therefrom. Lately, however, the practise has tended to become one of pathetic moaning, in the expectation that the Government, or someone, would do something about it. If self-pity, instead of self-reliance, had *always* been its watchword, mankind would never have reached the economic position it has—we would have remained cavemen up to the present time.

In the recent era in our country, one of the most frequently repeated moans has reference to the alleged disappearance of the Frontier and it is this subject that I would like to discuss briefly with you today.

Some irreverent wag once said of one of our oldest American cities that it was not a place but a state of mind. I believe that the same observation, without any irreverence, can be correctly made about the Frontier. An actual frontier is a place where life is hard, food difficult to come by, economic status of the lowest and most precarious, comforts and conveniences practically nonexistent, where the labor required to keep alive is so great that all but the most hardy perish in the effort. No schools, no roads, no hospitals. Yet it is the alleged disappearance of this place that is listed by the wailers as one of the hopeless signs for the future.

Surely no one will claim that the frontier in and of itself is a source of wealth or personal satisfaction. Fort Dearborn on Lake Michigan was the frontier a century ago. Yet it was but a drop in the bucket, by way of economic health and livelihood, when it was a frontier compared to what Chicago, which followed it, represents today. In fact, every physical frontier, if it leads to subsequent fruitful development, is likely to be but the tiniest fraction economically of what it later becomes. Why then the regret so often expressed nowadays over the alleged passing of the frontier? Why the feeling that the lack of it makes the economic outlook so hopeless?

The answer, it seems to me, is the one that has already been suggested: that the frontier is not so much a place as a state of mind. Its force and power arise from the energy it represents and the energy it develops. The greater the hardships and difficulties it presents to the pioneer, the greater the effort he puts forth to overcome them. The meaning and effect of the frontier are the character and ingenuity it brings into play. It calls for determination and rugged endurance, for vision and imagination, for looking to the future rather than longing for the past. The frontiersman cannot indulge in self-pity; for him it means destruction. So when we speak regretfully of the vanished frontier, it is what it induced rather than what it was that we must have in mind.

But when we have reached this point in our thinking, how absurd and shameful the whole lament becomes. The sufferings and privations of the frontiersman were due to the almost complete lack of facilities, the subsequent furnishing of which was what later wiped out the frontier—lack of tools, of transportation, of convenience and comforts, of equipment of all kinds. How much better, more quickly, more easily the frontiers could have been subdued if those who blazed the trails could have had the economic and mechanical equipment we have today!

Is it not crystal clear then that what we have truly lost is not so much the frontier (which was bound to go eventually) as the spirit and the courage which conquering the frontier required, and therefore brought forth, in the men and women who opened up the frontier. We who are living and working today are the successors of the pioneers who subdued our land frontiers? We have the same stuff in us; it needs merely to be called into action, not to be allowed to atrophy through despair and self-pity. How can we be even logical in claiming today, surrounded as we are in abundance with the equipment and facilities of present-day economic development, that our lot is anywhere near as hard or precarious as was that of our frontiersmen and women of 50 or 100 years ago?

If you concur in my reasoning, we are agreed that the effective value of the frontier as an economic factor is in reality the energy it induces and releases rather than any specific value in and of itself. This leads inevitably to the next inquiry, namely, what is our true status today with respect to frontiers so defined? If we admit, as I am perfectly ready to do, that our geographical frontiers are largely a thing of the

past, what of the much more important frontiers represented by a state of mind?

Viewed from this angle, which I hope I have shown to be the only really effective one, we discern new frontiers on every hand. The development and improvement of our existing economic system presents a much broader and more fruitful field than the mere settlement of new land. Of the products of the duPont company exhibited at the New York World's Fair, it is said that 80 per cent of them were unknown a decade ago. Even in the apparently thoroughly developed great rail transportation system of the country, where new frontiers might seem to be conspicuously lacking, the extension of performance has been notable. Freight trains now average to move 80 per cent faster than 15 years ago; the number of train accidents has been cut in two in the last nine years; in spite of higher wages, taxes and prices, the cost of moving a ton of freight a mile has been cut over 40 per cent in 16 years. In another of the world's oldest industries, glass making, new frontiers are right now being opened up by the most recent products being 32 times less breakable than the standard for a century before. The finest automobile of ten years ago is a lumbering contraption compared to the average car today. But why labor the point; these are but a few of the hundreds of new frontiers on which important economic achievement is going forward in our own time.

And how does this approach apply to our own business? Is not the whole history of the electric utility industry the story of a long series of ever new and widening frontiers opened up and developed with the pioneering spirit of the land frontiersman? The first electric light plant of over 50 years ago is analogous to the first log cabin in the backwoods settlement and the tremendous development of the present day where 100 billion kwhr are distributed per annum to 28,000,000 users of electricity finds its analogy in the thriving metropolis of today that grew from the first log cabin in the clearing. Why moan about the disappearance of the log cabin when we have the much greater development that grew from it, and when the present status beckons on to ever-expanding frontiers both wider and richer than their earlier prototype.

The log cabin, and the geographical frontier in which it was located, are but symbols of the outposts of the human mind and the human will and are important only as representing the power of that mind and will constantly to extend its frontiers. The broader the existing development, the more extensive and varied are the opportunities for further development and improvement, and the broader the field becomes, the more effective can each improvement be.

The opening of the land frontier was at best originally merely a matter of bringing more land under cultivation or finding new mineral wealth. The great effect economically was produced by the subsequent development. A century ago most of the people lived on farms and were engaged in the job of feeding and clothing themselves. Today the labor of only 22 per cent of the nation's workers is needed to feed and clothe the whole population and the energies of the remainder have thus been freed for the industrial activity which alone can raise the standard of living. The opening up of new land, when it has been done, is more or less a finished job, but the opening up of industrial frontiers can and does continue on all fronts long after the original beginning. There need be no end to this frontier extension so long as men are free and energetic and feel spurred on by the hope that they can improve their status by the results of their own efforts and ingenuity.

So let us not be deceived or discouraged by those shortsighted and unimaginative wailers who would have us believe that because one specific kind of frontier has become scarce or non-existent, that many other and wider frontiers are not constantly opening up before us, inspiring us to the same sort of self-reliant, determined tackling of each new frontier difficulty which presents itself to us today that our forefathers applied to opening up new lands many years ago.

Each new generation, like each new frontier, brings its own difficulties. If things were too easy we should become flabby and atrophied from the lack of tasks calling in their subjection for those qualities of character and endurance that in the past have made our people great. I believe one of these new difficulties in the present generation is the problem of rising above the cloying effect of the very abundance now of many things which a century ago were so difficult to obtain. Thus, what is one generation's meat is another generation's poison; but for this very reason we must be vigilant to make the best use of what each generation has to offer rather than simply to yearn for a past that cannot return.

In our great field of developing the electric services of the nation we have frontiers enough to satisfy the stoutest heart. We have hundreds of thousands of miles of rural lines on which to demonstrate the usefulness of electricity to the farmers they can serve; we have millions of homes that electrically speaking are still in the wilderness; we have a wide frontier for improving lighting standards in both the residential and the commercial field and a constantly widening field for the applications of electric power in industry; and through all this activity we must watch out for the Indians of bad public relations which must be fought back with all the vigilance and ingenuity we can muster.

Yes, we have plenty of frontiers. Let's shoulder our axes and muskets and subdue and settle them in the good old American way. This is the only way to succeed, but whatever the result, it will be lots more fun than merely pitying ourselves for fancied lost frontiers.

1940 EDISON ELECTRIC INSTITUTE CONVENTION

JUNE 3-6

MUNICIPAL AUDITORIUM, ATLANTIC CITY

Two of Four Major E. E. I. Code Proposals Accepted by N. F. P. A. Electrical Committee

THE Electrical Committee of the National Fire Protection Association met on December 4 at Atlantic City for the purpose of acting upon proposed revisions of the National Electrical Code. Naturally the decisions on the proposals of the Electric Light and Power Group are of outstanding interest to electric utilities.

Of the four major proposals two were accepted by the Committee: the use of conductors having thinner insulation than heretofore, and a substantial liberalization of the limits for the occupancy of conduit in rewiring existing installations. The two other major proposals, which were for the use of bare neutral conductors in rewiring jobs, and for the general recognition of the "CNX" method for wiring frame residences and similar structures, were not approved by the Committee and will not be included in the revised National Electrical Code which may be expected to be in general use in the autumn of 1940.

Although not a part of the Electric Light and Power Group program, another action taken by the Committee is of immediate interest to electric utilities. The Committee approved rules which will have the effect of making mandatory the use of "non-tamperable" plug fuses after a waiting period which will extend until the autumn of 1941, or one year after the effective date of the 1940 Code.

While electric utilities have been sympathetic toward the aspirations of the electrical inspectors who have hoped that rigid requirements for the use of these "non-tamperable" fuses would abate or even cure the evils of shunted fuses and overloaded circuits, they have felt it necessary to point out certain limitations which their experience had suggested. In the first place, their experience has produced some skepticism concerning the probable effectiveness of this means of combating overfused circuits. Of immediate practical importance however is the problem of servicing customer installations where a large number of different and non-interchangeable plug fuses are in general use. This consideration has led the Electric Light and Power Group to condition their approval upon a requirement for universal interchangeability.

It appears that there are several differing types of plug fuses offered as "non-tamperable" which are not interchangeable, either among themselves or with the present standard plug fuses. The elements on the Electrical Committee who have been urging the use of the new fuses have apparently been unable to cope with this difficulty, for after several years of false starts the proposal this year was for the mandatory use of these devices without regard to interchangeability. This proposal prevailed. It may therefore be expected that utilities will be faced in the future with a vexing problem, and possibly considerable expense, in connection with the servicing of consumers.

It is probably well known that the four major proposals of the electric utilities were made in the interest of two principal developments, both directed toward the production of more copper and more outlets in wiring installations. One of these developments concerns what has been called "commercial rewiring" and the other relates to the more adequate wiring of small and generally non-fireproof structures, typically dwellings or other domestic occupancies. From the gains and losses mentioned above the "commercial rewiring" program has come out best since the fairly liberal provision for thinner insulation on conductors will no doubt prove to be of good utility in making effective use of the available space in existing conduits. In addition to this, these same existing conduits may be more completely filled than the Code has permitted heretofore. The problem has been that consumers were unwilling to undertake the radical and expensive structural changes necessary for complete new conduits that would otherwise have been required for feeders if lighting levels were much increased or other uses of electricity undertaken on a large scale; this difficulty has been substantially, although not completely, relieved.

The third feature of our proposals that would have been useful for commercial rewiring was lost, even although this proposal, the one for bare neutral, was modified to restrict its use to the larger conductors and to feeder circuits. It is of course with such wire sizes and such circuits that space savings by omitting insulation altogether is of greatest use. The loss of this feature will no doubt limit an ideal development of the plan to revamp overloaded installations with really generous amounts of effective copper, but the two points that have been gained will have substantial effects in the right direction.

The other half of the utility program which concerned the more complete wiring of small residential buildings by means of a conductor material especially developed for this purpose, the covered neutral concentric cable, best known perhaps by its nickname "CNX," did not fare so well. The recognition in the Code of this particular material was the principal proposal made in the interest of this part of the program, and as noted elsewhere the Code committee did not act favorably upon it. From the standpoint of the promotion of adequacy in domestic installations, and of the economics of the residential use of electricity, this is a great pity, as the field record where the "CNX" material has been extensively used showed quite plainly that it was successful in promoting fully adequate installations in modest homes, with regard to sufficient copper, sufficient circuits and ample numbers of outlets.

With respect to these two proposals, the bare neutral and "CNX," which did not succeed in commending themselves to a sufficient majority of the Electrical Committee to find a place in the new Code, it may be said that every reasonable effort had been made to exhibit their commendable properties to the Committee. The original proposals for their recognition had been made a year and a half in advance of the meeting. They had been discussed for two years in the meetings of the various electrical inspectors and similar organizations. Four elaborate brochures have been published

which contained, between them, a complete discussion of all of the technical, economic and commercial features involved. Men were maintained in the field to discuss any of these features with anybody interested in them. Finally a somewhat impressive field record of experience with installations involving each of these proposals was published and widely circulated. It is a notable circumstance that throughout the Electrical Committee meeting, which was a long and arduous one, this published record of field experience was not questioned. It was apparent that a minority of the Electrical Committee was not prepared to recognize the field experience as adequate and convincing. This will of course be remedied with time, but in view of the fact that the recorded experience is not inconsiderable and is wholly favorable, it may perhaps be asked, in the utmost good humor, just how much field experience is expected. That is to say, if a novel practice must become a settled and regular practice before it is qualified for recognition in the Code, then what is the Code for?

As a matter of fact, both of the lost proposals were lost by rather close votes, and in both cases a majority of the committee was favorably disposed, but a two-thirds majority is necessary for Code recognition. Although this requirement worked against the utility proposals on this occasion, experience has shown that it is a wise provision. It is natural that those who have worked hard to build up a sound technical and economic case for the two important proposals should experience some chagrin at the outcome. It may be cold comfort to them to know that they achieved a moral victory since houses can't be wired with moral victories. But such it was, nevertheless, since in each case actual majorities were recorded in favor of the proposals. It is worth recording that those in favor of Code recognition for bare neturals in conduit and concentric covered neutral cables included, in addition to the engineers representing the Electric Light and Power Group, the representatives of the Electrical Manufacturers who are specialists in wiring materials, the representatives of the fire insurance underwriters, the engineers of Underwriters Laboratories and a substantial number of electrical inspectors.

On the whole, the requirement for a rather large affirmative majority in Committees like the Electrical Committee, or any other standardizing committee, is a wholesome one. It has long been observed that practical unanimity is necessary to make industrial standards really effective in their fields. The reason for this is quite obvious since these standards have no legal effect, the only force they have is that due to a general agreement among the parties at interest, and this in many cases can only be achieved by the exercise of a great amount of patience and accumulated experience.

In the present case the opposition to these proposals appeared to be due to radically differing concepts of the scope of the Code as much as to any other single cause. A part of the representatives to the Electrical Committee appear to regard the Code as a sort of master specification and regulator of the art of house wiring, even although the stated purpose and scope of the Code itself explicitly denies any such function. On the other hand other members of the Committee, notably the Electric Light and Power Group, regard the Code as a manual of good practice, particularly as a manual of practice acceptable to fire insurance underwriters or useful to local authorities in the interest of public safety.

The case of the bare neutral conductor is pertinent. In proposing the recognition of this practice, the electric utilities had in view its usefulness as an expedient where space saving is important and not by any means that it would be universally used. In short, they had in mind a useful technical expedient which, under existing Code rules, required Code recognition before it could become generally available. Under practical conditions it is probable that the use of this expedient might be indicated once in ten times, or thereabouts. Under these circumstances the technical features of the proposal are about all that is important as to whether it is or is not an admissible practice; the general effect on practice would be very slight indeed.

On the other hand, the trend of the discussion among those who hesitated to recognize bare neturals clearly indicated that their view of the question contemplated its general use, even more, that Code recognition implied a sort of design standard, or an obligation to use it. This is the specification concept of the Code, which according to our views is inadmissible under its scope.

The matter has considerable importance in a broader sense, because it is one thing to set up a suitable manual of technical practice in any particular field, but quite another to legislate upon a master specification that might conceivably have unlooked for effects upon the economics of an industry. It seems to be doubtful whether many of the participating organizations have any wish to participate in the latter type of activity.

A word should be said concerning the disposition of the remaining proposals of the Electric Light and Power Group. The minor proposals, which mainly had to do with admissible types of wiring in places of assembly, hazardous locations, etc., were variously dealt with. As early as March, 1939, the Electric Light and Power Group had clearly indicated that this group of proposals was not of vital interest to the industry, they had been pointed out as examples of inconsistencies, lack of conformity with the purpose of the Code, and for similar reasons. Most of them did not commend themselves to the Electrical Committee, but some were adopted in part. The exact way in which they may appear in the next edition cannot be stated with much accuracy until a revised text is available.

Summing up the whole event it may be said that the new Code will make possible some useful advances in the field of commercial rewiring, but with regard to our proposals for the bare netural conductor and the use of covered neutral concentric non-metallic sheathed cables, it is apparent that the Electrical Committee is not prepared to act favorably on the existing experience record, and that a much more extensive field record will be required to persuade them.—*A.M.*

"Sun to Sun", New Duquesne Light Company Film

THE Duquesne Light Co. has recently released a special sound motion picture entitled "Sun to Sun."

Made entirely in the Duquesne Light territory by a professional producing company, the picture is intended to give the public a much clearer picture of the internal operations of an electric utility company. It shows the tremendous investment, numerous and intricate machines and the untiring and devoted personnel which is at all times at their service the instant service is wanted. The picture is a clear, concise story of electric service, from the mining of the coal in the hills of Pennsylvania to the delivery of electricity in the factory, store or residence.

Duquesne Light is making the picture available for use on the programs of organizations of any type, including clubs, civic organizations, churches, social and service groups, etc.

Load Building, Its Effect on Rates and Investment

By R. R. Herrmann

Manager, Rate & Sales Research Dept., Northern States Power Company, Minneapolis, Minn.

OFTEN something can be described better by stating the opposite. The opposite of load building exists when a company believes the public must buy from it and then sits down to wait for business, doing nothing in the meanwhile to encourage the use of its product. It is obvious what a negative effect that type of policy would have had on the electric utilities during the past ten years. Reduced rates and declining revenues would have resulted in an industry going steadily backwards instead of steadily forward.

The generally accepted method of encouraging customers to use more electricity is through promotion of equipment to utilize the electrical energy, thus increasing the output of our plants, which is Load Building. This may be applied not only to residential business but to commercial and industrial use as well.

Load Building in the industrial classification is rather difficult to accomplish, but nevertheless is being done. By that is meant that a customer operating a factory may be using all the power he requires but may be accomplishing a certain process by some means other than with electrical power. Here is where load building enters the picture. If this process can be done with electrical power, or if a better process which will require electricity can be developed, a chance to increase our load exists.

With our commercial customers I believe it is safe to state that there is hardly a commercial establishment which cannot use more lighting. This then offers a field where there are considerable load building possibilities. In general these possibilities are very attractive from a profit standpoint, and are being developed at a cost well in line with results obtained.

But the greatest load building efforts of recent years have been aimed at residential use. In Fig. 1 is shown the growth in residential use per customer, coupled with the drop in the average residential rate. During the 26 years from 1913 to 1939 the average residential use has increased 237 per cent.

When we take our thoughts back 15 or 20 years and realize that the average residential customer used much less than 1 kwhr per day and that since that time the average use has increased until today it is several times this amount, we at once begin to wonder about the possibilities still open in this field. Let us start our speculations with one question. How far have we gone with our present load building efforts?

This question is partially answered by studying national saturation figures on major appliances and sales volume on other items. In 1938, 8 per cent of the nation's electric customers had electric ranges, 3 per cent had electric water heaters, 53 per cent had refrigerators, and so on. Apparently we have a long way to go with these three appliances alone.

A host of smaller appliances have been sold, and long steps have been made toward greater lighting usage. To determine how all these various factors have affected the consumption of the different usage groups, we analyzed the residential bills of a group of Wisconsin communities for which comparable

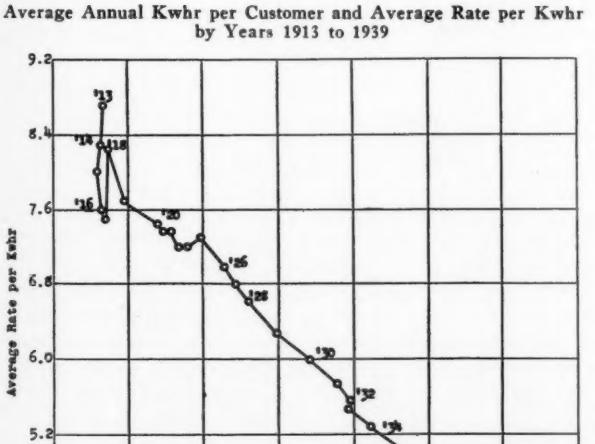


Fig. 1—U. S. Residential Sales

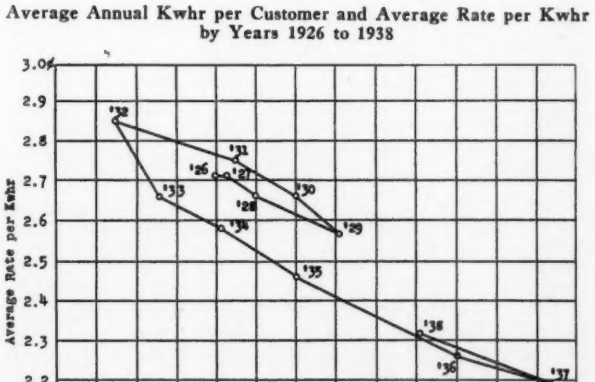


Fig. 2—Total Sales to Ultimate Customers in U. S.

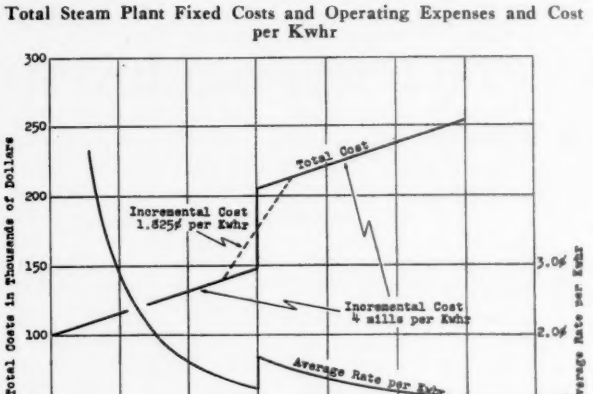


Fig. 3—Cost of Energy Production

data was available for the years 1932 and 1936. In making this analysis of all bills, the 20 per cent of the total bills representing the smallest usage in 1932 was compared with the similar group of four years later. Each 20 per cent group of bills was similarly compared. Electric water heating was separately metered, and was not included.

In four years, the average consumption of all customers increased 10.4 kwhr per bill, or 25.1 per cent. But the lowest 20 per cent of the bills increased only 1.1 kwhr (15.9 per cent), while the highest 20 per cent increased 29.2 kwhr (22.5 per cent). The percentage increase in the intermediate groups was enough larger to produce the over-all average of 25.1 per cent. Of the entire group, only 50 per cent of the bills were for more than 22 kwhr in 1932. Four years later there were still only 50 per cent of the bills for more than 26 kwhr, an increase of only 4 kwhr.

This confirms the fact that increases in usage during recent years, in Wisconsin at least, were caused principally by a very great increase by a small portion of the customers. The fact that the increases have been highly concentrated has had a considerable effect on the average residential rate.

Let us again glance at Fig. 1, with especial attention to the drop in average rate per residential kwhr for the country as a whole. Since 1913 the average rate has decreased from 8.5c. to less than one-half of this amount. In Fig. 2 is shown the similar relationship between the average rate paid by all customers and the average use, and, except for the turning back of the curve due to lesser consumption from 1929 to 1932, it likewise shows a downward trend. In 1926 the average rate was about 2.7c, whereas in 1937 it was 2.2c.

Load Building has been the primary factor effecting this change, and has operated in a number of ways. Load Building has reduced the amount of investment required to produce a unit of power, and has also reduced the direct (operating) expenses incurred per unit of energy. Rate structures and changes in schedules reflect these savings and cause the decreasing average rate per kwhr we have noted.

The effect of load building on investment is shown in Table I. This shows the investment in utility plant in a Minnesota city of about 20,000 people from 1923 up to and including the present year. In 1923 the fixed assets per kwhr sold amounted to 24c. and now they are 16.3c. Assuming the annual fixed charges to be approximately 10 per cent, this means that the average amount chargeable to each kwhr sold to take care of the fixed charges has been reduced from 2.4c. per kwhr in 1923 to only 1.6c. in 1939. It is also interesting to note that the assets per kw of demand have been reduced from $726 to $496 during this same time and that the load factor has increased from 39.2 per cent to 42.2 per cent.

Table II shows similar figures for a large municipal utility on the West Coast where generation is predominately by water power. In this utility the fixed assets in 1922 were 25.2c. per kwhr and in 1938, 18.8c. per kwhr. The investment per kw of peak load has been reduced from $694 to $604, and at the same time the load factor has improved slightly.

In trying to secure figures of a similar nature for private utilities, the difficulties at once become apparent. Private utilities are the result of expansion and growth so that the figures on investments per kwhr sold extending over a long period would not be representative or similar to the figures shown in the first two tables. However, there are two private utilities in the Middle West which have not been extending their territories greatly during the past six or seven years and which did not own and operate gas systems during the periods considered. The figures shown in Table

TABLE I

Year	Kw Peak Demand	(Thousands) Kwhr Sales	Yearly Load Factor	Assets per Kw of Demand	Fixed Assets per Kwhr Sold
1939	6,000	18,308.1	42.2	$496	16.3c.
1938	5,200	16,122.1	43.0	567	18.3c.
1937	4,700	14,440.2	39.5	617	20.1c.
1936	4,300	12,693.1	38.7	574	19.4c.
1935	4,000	11,509.3	38.0	604	21.0c.
1934	3,800	11,007.5	37.8	655	20.4c.
1933	4,500	11,038.7	31.3	504	20.5c.
1932	4,100	11,601.7	35.7	538	19.0c.
1931	3,700	11,109.3	37.1	554	18.5c.
1930	3,500	9,691.4	35.9	528	19.1c.
1929	3,200	8,666.7	33.9	563	20.8c.
1928	3,200	9,162.3	35.8	523	18.3c.
1927	2,750	7,949.0	38.9	588	20.4c.
1926	2,450	7,146.7	37.8	648	22.2c.
1925	2,200	6,682.1	39.4	679	22.3c.
1924	2,200	6,397.9	37.7	648	22.3c.
1923	1,950	5,894.3	39.2	726	24.0c.

TABLE II

Year	Kw Peak Demand (Thousands)	Kwhr Sales (Thousands)	Yearly Load Factor	Assets per Kw of Demand	Fixed Assets per Kwhr Sold
1938	111.0	337,803.8	45.2	$604	18.8c.
1937	103.1	331,173.6	46.5	612	19.0c.
1936	104.4	309,707.3	42.4	570	19.2c.
1935	88.0	277,309.8	45.4	657	20.8c.
1934	85.0	268,385.2	45.8	654	20.7c.
1933	83.0	249,743.2	44.2	659	21.9c.
1932	87.5	262,793.5	43.5	618	20.6c.
1931	90.0	281,233.8	44.9	582	18.6c.
1930	95.0	309,736.7	46.3	500	15.3c.
1929	90.0	300,579.4	46.8	474	14.2c.
1928	76.8	238,635.4	45.8	491	15.8c.
1927	75.0	211,615.4	41.7	429	15.2c.
1926	64.8	181,301.1	41.0	466	16.7c.
1925	59.6	174,084.4	41.8	497	16.4c.
1924	50.8	112,921.6	32.0	530	23.9c.
1923	35.6	85,704.0	37.0	677	28.1c.
1922	26.9	74,108.0	41.5	694	25.2c.

TABLE III

Company No. 1

Year	Generating Capacity Kw	Kwhr Generated (Thousands)	Plant Invest. per Kwhr Generated	Kwhr per Kw of Capacity
1938	111,750	389,728	9.73c.	3,487
1937	106,750	397,622	9.21c.	3,725
1936	96,500	393,795	8.95c.	4,080
1935	98,000	354,800	9.48c.	3,620
1934	98,000	348,495	9.54c.	3,556
1933	98,000	314,902	10.53c.	3,213
1932	98,000	313,611	10.54c.	3,200

Company No. 2

1938	89,000	305,724	11.31c.	3,435
1937	66,000	319,946	10.14c.	4,848
1936	66,000	299,415	10.50c.	4,537
1935	70,000	265,794	11.71c.	3,797
1934	70,000	240,481	12.77c.	3,435
1933	70,000	225,143	13.58c.	3,216
1932	70,000	235,851	13.00c.	3,369

III are therefore comparable to those of the municipal utilities shown in Tables I and II with the one distinction, however, that the table shows kilowatthours generated and capacity installed instead of kwhr sold and peak loads. For the purposes of this discussion, however, allowance can be made for the losses incurred and also for excess of installed capacity over the peak load. These figures show in a similar manner that the investment per kwhr sold or generated has decreased over the period covered by the figures. For the country as a whole, the U. S. Census of Electrical Industries shows a similar trend in the past 15 years. From 1922 to 1937 electric utility plant assets have been reduced from 13.6c. to 12.6c. per kwhr sold to ultimate consumers. Figures obtained from 1927 and 1932 census show higher assets per kwhr than those already indicated. This may be the result of the great expansion during this period because of anticipated sales which did not immediately materialize to the extent expected.

The effect of load building on the economies of production are also not to be overlooked. The constantly increasing demands for larger steam plants because of the increased load from year to year has given an incentive to the manufacturers of such equipment to apply all the technical knowledge which is available and to conduct a considerable amount of experimental work with the result that the average amount of fuel used per kwhr produced is now 1.4 lb. per kwhr as against 3 lb. in 1920 and 5 lb. in 1910. All this increased efficiency is not attributable to improvements by the manufacturers alone. The higher load factors already noted mean that plants operate under more favorable conditions. The most efficient unit of the system may be operated for a greater number of hours, and the cost of "start-ups" is reduced.

Although the figures and tables shown are rather meager and not complete, nevertheless they lead one to conclude that regardless of where the subject may be investigated, whether on the Pacific Coast, the north central portion of this country, or elsewhere, the picture is about the same.

Because of confusions in basic definitions regarding distribution and transmission facilities, it is difficult to obtain clear-cut figures showing the overall effect of load building on this type of investment. With regard to transmission there is a great variation from one locality to another, depending on the type of load served and the nature of the area served.

In the case of distribution facilities it is possible to arrive at fairly accurate results for any particular type of load under given conditions. In a previous article* a table was included showing the reduction in additional distribution investment per range over a period of years. In one Minnesota town this dropped steadily from $163.50 to $67.50 during the period of 1926 to 1937. These figures apply to ranges added to an existing distributing system. In the case of a growing community where range capacity in a new locality can be provided at the time of the original installation, the additional local distribution investment may be under $10 per range, based on an overhead system.

All these figures belong to the "before and after" school of thought, by which I mean they show a picture before the load building took place, and then show it after the growth has occurred. To properly study what has actually taken place during the interval it is necessary to consider incremental expense, which we have heard so much about during the past several years.

Just what is incremental expense? Our ordinary thoughts run along the line that incremental expense is the ad-

* Value and Characteristics of Electric Cooking, Water Heating and Refrigeration Loads, by R. R. Herrmann, *Edison Electric Institute Bulletin*, April, 1938.

ditional expense necessary to take on a small amount of additional business and that it is never as great as the average expense. While the data and figures shown indicate that this is generally true, a hypothetical analysis of this question should be made to eliminate possible difficulties later on.

Fig. 3 shows how the incremental expense of a steam generating plant varies with output. These figures are theoretical, include fixed charges and operating expenses, and are based on 4000 hours use of demand each year. When one 3000 kw unit is installed the maximum output is represented by 12,000,000 kwhr. One might conclude that the incremental expense of producing additional kilowatthours would be only that represented by the 4 mills indicated on the chart. If, however, the generating plant is producing 10 million kwhr and an additional load of 4 million kwhr is taken on, it means that an additional unit will have to be installed. This involves an increase in fixed charges and the addition of a certain amount of operating expenses over and above those variable expenses represented by the 4 mills per kwhr. In our hypothetical case the additional load of 4 million kwhr will then cost $57,000 plus 4 mills per kwhr or $73,000. This makes an additional cost of more than 1.8c. per kwhr. Is not the true average incremental expense something more than 4 mills per kwhr? Should it not be over twice as much? A similar situation exists with transmission and distribution systems.

The argument has sometimes been used that a certain amount of spare capacity is required at all times, so why cannot an additional load be taken on at a low rate so that this spare capacity or a portion of it can be utilized? The fallacy in this argument is that if such load uses the spare capacity and the load generally is increasing, it will be necessary to install additional facilities at a much earlier date than would otherwise be necessary. In other words, the proper incremental rate is made up of two portions, one covering the additional expense incurred in operating the property, that is, in producing the energy, etc., and the second, the expense represented by the fixed charges on the equipment. Because equipment cannot be installed gradually but must be installed in units, one is often deceived as to what the proper rate for incremental business should be.

This matter of incremental costs has a direct bearing on the subject of electric water heating. Water heating must be sold at a low rate and this cannot be done except as incremental business. By limiting the size of the water heating element and controlling the hours of operation so that no increase in distribution, transmission or generation equipment is required, except the meter and control device, the second element of incremental expense need not be considered, leaving production expense only. If, however, instead of limiting the size of water heating elements in the home to 1 kw, a larger size were permitted, the utility would later be confronted with the necessity of providing additional distribution capacity and perhaps transmission and generation as well, and the incremental expense of serving water heating would no longer be confined to production only. The other element, namely, fixed charges on additional equipment, would have to be considered, because of a possible new peak load occurring immediately after the designated on-peak period. In such instances the additional revenue from water heaters may be insufficient to justify the additional capacity necessary and the utility may be considerably embarrassed.

The same situation may be caused by other loads which may be served at a low rate, and even though these may be

(*Continued on page* 580)

Utilities and U. S. Bureau to Hold Meeting on Weather Forecasting

DURING the past year, due to the initiative of the new Chief, Commander F. W. Reichelderfer, the United States Weather Bureau has been making many improvements in its organization and operation so that the Bureau may make more extensive use of new techniques in weather forecasting that have been developed during the past several years. More general use of air mass analyses, rather than forecasts based on surface conditions alone, is only one of the improvements. Commander Reichelderfer has shown an interest in learning the problems and needs of various industries in weather forecasting so that the Bureau may better serve those needs.

The Hydraulic Power Committee of the Pennsylvania Electric Association has been working informally with various representatives of the Weather Bureau in the preparation of extensive studies of river flow and flood forecasting in Pennsylvania and adjacent states. Likewise, the Systems Operation Committee has made studies on load forecasting and has reviewed the effects that changes in the weather have on power systems' loads.

These two committees have made arrangements with Commander Reichelderfer for a joint meeting of these committees and other interested representatives of the electric utility industry with various representatives of the Weather Bureau in Washington, D. C., on Friday and Saturday, January 19 and 20.

The utility representatives will discuss the effects of weather changes on system load forecasts, the scheduling of the operation of hydro electric operations, the planning of maintenance and construction programs, and the effects of severe storms on system operation. The discussions will develop how improvements or changes in the manner of the forecasts can work to advantage. The Weather Bureau plans to describe what is being done to meet the problems of industry and requirements of the country generally as to weather information and forecasts. Likewise, the problems of making forecasts will be described and demonstrated. Discussions will develop many ways that power companies with extensive communications can assist the Weather Bureau in assembling weather information when help is needed.

Dr. Ralph Krick, of Pasadena, California, who is head of the Krick Industrial Weather Service, has accepted an invitation to attend this meeting and deliver an illustrated talk at one of the sessions describing what his service offers the industry. Representatives of one or more power companies which subscribe to Dr. Krick's service are expected to be present to explain what results and benefits they have obtained from this service.

Any interested utility desiring to send representatives to this two-day meeting at the Hotel Shoreham, Washington, D. C., should communicate at once with Wm. R. Hamilton, West Penn Power Company, 14 Wood Street, Pittsburgh, Pa., since this meeting will be open only to such representatives and to guests who are especially invited to participate in the program.

A Street Lighting Standardization Plan

By F. W. Nimmer
Ohio Edison Company

A paper presented before the Transmission and Distribution Committee, E.E.I., New Ocean House, Swampscott, Mass., Oct. 11, 1939

IN the field of street lighting we in this country seem to be rugged individualists.

Many and varied types of street lighting systems have been created to satisfy individual tastes. It seems that each new street lighting project required a little different type of lighting unit depending on the industriousness of salesmen, the reactions of the municipalities or the idiosyncrasies of the lighting engineers concerned with the project. Ohio Edison Company, like most other companies, followed this general trend. We have now nearly 100 different street lighting systems with very little interchangeability of component parts. These many systems in the aggregate require large stocks of repair parts and the men who operate and maintain these numerous systems must be able to select the proper repair materials and understand the peculiarities of all—if the systems are to function normally. Manufacturers tell us that they list some 10,000 to 15,000 combinations of street lighting fixtures and one states that he has over 200,000 drawings in his files on street lighting items alone.

Public officials are recognizing this situation and are beginning to ask the utilities to standardize street lighting schedules which in turn requires standardization of street lighting systems. Mr. E. W. Morehouse of the Public Service Commission of Wisconsin in an address before the League of Wisconsin Municipalities said:

"The Commission has encouraged each of the larger utilities to standardize its street lighting schedules. . . . Progress along this line has been hampered by the great variety of street lighting systems in use, and the consequently wide variations in costs. . . .

"Also, the Commission has encouraged the larger utilities to standardize on a relatively few types of street lighting fixtures. Here is where municipal officials can especially help in reducing costs. Instead of giving your artistic impulses free reign in selecting street lighting fixtures, so that a utility has to stock replacement parts for a dozen or fifteen different types of fixtures, select from a few standard types. . . . This standardization of equipment cannot be done economically in a day. But it is a desirable tendency, provided the utilities will change as rapidly as is economical to well-proved superior equipment when it comes; and it is a tendency which makes a uniform rate schedule more reasonable than would otherwise be the case."

Table I—A Comparison of Day and Night Fatality Rates According to the Grade of Street Lighting and Automobile Traffic Flow

Traffic	Lighting	Average Lumens per Linear Foot	M.V.M. Day	M.V.M. Night	Fatalities Day	Fatalities Night	Fatality Rate per M.V.M. Day	Fatality Rate per M.V.M. Night
A	A	147	251	73	52	108	.20	1.47
A	B	76	230	55	59	145	.25	2.63
A	C	36	48	9.5	5	32	.10	3.36
A	D	18	64	13	10	46	.15	3.54
B	A	149	8.5	3	4	5	.47	1.66
B	B	73	63	20	31	61	.49	3.05
B	C	35	20	3	4	20	.20	6.66
B	D	18	51	10	11	56	.21	5.60
C	B	71	9.5	36	2	11	.21	3.05
C	C	33	8	1.5	2	10	.25	6.66
C	D	16	14	3.2	6	23	.42	7.18

M.V.M.—Million vehicle miles per year.

Recognizing the situation as outlined above and confronted with major street lighting improvement projects in the three divisions of Ohio Edison Company, the management considered it advisable to have an engineering study made of the subject leading to recommendations for standardization of systems and schedules.

An intelligent approach to the problem of standardization naturally prescribes a survey of the needs of street lighting. What functions should a good street lighting system perform? The I.E.S. Code of Street Lighting answers this question quite completely, as follows:

1. To promote safety and convenience in the street at night through adequate visibility.
2. To enhance the community value of the street.
3. To increase the attractiveness of the street.

We believe that the first purpose indicated—the promotion of safety—is the most important and should require our very careful attention. Much data have been compiled on the subject of street safety—particularly night safety versus daytime safety. A review of some of these figures should be very valuable to a proper analysis and solution of the problem. Through the cooperation of various agencies traffic counts and street lighting data are available. Data on 45 cities were assembled by the I.E.S. Committee and is presented in a summary form as indicated in Table I.

This tabulation indicates that for a given density of traffic the night fatality rate per million miles of night traffic increases with the decrease in illumination. (Columns 3 and 9.)

Another table (II) indicates the excellent results which can be attained by unusually high intensities of lighting. On all of the exceptional streets included in this tabulation the automobile traffic is very heavy, in some cases reaching hourly peaks of 15,000 cars. Note that the night traffic is about 50 per cent of the day traffic instead of the usual 20 per cent.

In spite of the heavy traffic conditions the night fatality rate per M.V.M. is less than twice the day rate whereas the previous tabulation indicates a ratio of about 7 to 1.

Table II

Traffic	Lighting	Average Lumens per Linear Foot	M.V.M. Day	M.V.M. Night	Fatalities Day	Fatalities Night	Fatality Rate per M.V.M. Day	Fatality Rate per M.V.M. Night
A	AA	680	134	65	23	20	.17	.30

In general, statistics show that the fatal accident rate per mile of travel in the United States is three times as high at night as during the day. In 1937, out of a total of 39,000 traffic fatalities approximately 24,300, or 62 per cent, occurred at night even though night traffic is estimated at not more than one-third of the total. Intensive safety measures have been very successful in reducing day-time fatalities, but the total continues to rise. From 1930 to 1939 the day fatality rate decreased 5 per cent but the night fatality rate increased 43 per cent.

According to Rufus G. Jasper of the National Safety Council, 26 pedestrians are killed at night for every 10 pedestrians killed during the hours of daylight.

These data definitely indicate the necessity of coordination of the street lighting standardization plan with the traffic density to insure adequate lighting.

Further studies indicate the importance of adapting the lighting plan to the street surface encountered. As stated by a leading lighting expert, "The major purpose in the design of traffic safety lighting is to enhance silhouette vision by increasing pavement brightness and, because the burden of avoiding an accident rests mainly upon the automobile driver, it is important that the maximum surface brightness should be visible from the driver's seat."

Many pavements do not permit of adequate light treatment because of their high absorption or improper reflection of light. A consulting engineer states that dark pavements reflect as little as 4 per cent of the light thrown on it, whereas properly selected surfacing materials will reflect as much as 30 per cent and that the latter surfacing material will appear uniformly bright even when wet. Of course, pavement brightness need not necessarily be uniform to provide uniformity of illumination from the standpoint of traffic exposure. It is unthinkable that anyone would permit an architect to design a home giving little or no consideration to lighting design and on completion of the house attempt to install adequate lighting, but our various governing bodies continue to install lighting on streets and highways exerting little or no effort to provide a proper street surface as the foundation for adequate light treatment. Recognizing the seriousness of night traffic hazards as indicated above, it is recommended that the engineers of our various utilities cooperating with the National Safety Council, manufacturers, and civic organizations, see to it that this matter is called to the attention of the proper departments of municipalities and political bodies having jurisdiction over our streets and highways, so that the overall engineering design will produce the most efficient results not only for daytime traffic but more especially for the more hazardous night traffic.

Adequate lighting design, as we all know, must take into account varying weather conditions.

Another phase of the problem which has not received proper attention is the adaptation of the lighting design to variations in traffic flow. We usually speak of silhouette effects produced with the assistance of pavement reflection, but we have not said much about the ability to see when the surface is obstructed partially by moving traffic. Also, what happens to the lighting design under varying conditions of traffic speed. We know that required vision is proportional to speed; that higher intensities are necessary at the higher speeds. In other words, should we overlook the problem of *"movement visibility?"*

All of the above data lead to the following important conclusion: we should not confine our requirements to the production of a given quantity of foot candles of illumination on the street only, but we should provide a standard of visibility at the eyes of the driver or pedestrian which will include recognition of the various factors affecting vision. The proper application of this standard should result in an immediate response on the part of the driver or pedestrian to any emergency and should result in the least possible fatigue during long periods of exposure. Let us not provide street lighting only, but let us provide *light conditioning* of our streets and highways.

As to physical design, our I.E.S. Code Committee tells us that luminaires are more effective when mounted over roadways than when mounted back of curb lines.

In addition to the above requirements for light conditioning an important factor not to be overlooked in this study of street and highway lighting standardization is that of overall economy—what will its annual cost be?

Our problem has now been outlined. What lighting units are available to best fit the above conditions? We have indicated the effectiveness of pendant units mounted over roadways. The newly developed pendant type units with concealed light sources utilizing the Alzak processed aluminum reflecting surfaces more closely approximate the above requirements than any of the units produced thus far. We obtain from two to four times as much light on the street using this unit as compared to the customary upright mounted type of unit. The light distribution is more nearly in accord with our requirements even though it could be improved, to obtain optimum light conditioning of our streets. The efficiency of the unit is considerably higher than that of former types.

We previously indicated the correlation between light output and traffic safety. Lacking a great deal of adequate information relative to the proper application of light to the varying conditions of traffic flow, traffic speed, pavement surfaces, etc., we are not able to attain the maximum desirable light conditioning of our streets at the present time. However, we do know that certain minimum values of light output have resulted in relatively safe conditions of travel and those values have been used as guides. The I.E.S. Code has produced minimum tables of light intensities for several groupings of traffic flow which may serve as a starting point and the experiences of a number of cities under actual conditions of traffic flow provide good indices of the results to be obtained under given lighting arrangements. Utilizing these data, we have set up the following classifications:

1. *1,000-2,000 Vehicles per hour*
   Heavy traffic arteries and main commercial streets.
2. *500-1,000 Vehicles per hour*
   Secondary traffic arteries.
3. *0-500 Vehicles per hour*
   a. Residential ornamental areas.
   b. Secondary residential areas.
   c. Minor residential areas.

Lighting units were then assigned to the above traffic conditions which in our opinion, will provide adequate lighting as we know it today.

(1) **Heavy Traffic Arteries and Main Commercial Streets*

1. *Supporting Structures*
   a. The ornamental standard shall be approximately 7″ x 4″ x 24′ heavy duty fluted steel column with 2″ x 6′ upsweep universal clamp type bracket. Standard to be mounted on concrete base.
   b. The ornamental bracket to be the universal type for mounting on existing steel or wood pole. The bracket to be a 2″ x 6′ upsweep bracket with supporting brace.

* This type of system may be used with either underground or overhead circuit.

2. *Luminaire*
The luminaire shall be pendant type with concealed light source utilizing Alzak processed aluminum reflecting surface suitable for 10,000 and 15,000 lumen lamps, detachable globe and with hood for internal wiring.
3. *Lamp*
The lamp size shall be limited to 10,000 lumens and 15,000 lumens.
4. *Mounting Height*
The recommended mounting height shall be 23 ft. minimum and 25 ft. maximum.

(2) **Secondary Traffic Arteries*
1. *Supporting Structures*
a. The ornamental standard shall be approximately 6" x 3" x 21'-6" heavy duty fluted steel column with 2" x 6' upsweep universal clamp type bracket. Standard to be mounted on concrete base.
b. The ornamental bracket to be the universal type for mounting on existing steel or wood pole. The bracket to be a 2" x 6' upsweep bracket with supporting brace.
2. *Luminaire*
The luminaire shall be pendant type with concealed light source utilizing Alzak processed aluminum reflecting surface suitable for 2,500 and 6,000 lumen lamps with hood for internal wiring and equipped with the hinged type globe holder.
3. *Lamp*
Recommended lamp sizes shall be 2,500 lumens and 6,000 lumens.
4. *Mounting Height*
The recommended mounting height to be 20 ft. minimum and 25 ft. maximum.

(3) **Residential Ornamental Lighting Areas*
1. *Ornamental Standard*
a. The ornamental standard shall be approximately 6" x 3" x 21'-6" heavy duty fluted steel column with 21" x 6' upsweep universal clamp type bracket. Standard to be mounted on concrete base.
2. *Luminaire*
The luminaire shall be pendant type with concealed light source utilizing Alzak processed aluminum reflecting surface suitable for 2,500 and 6,000 lumen lamps with hood for internal wiring and equipped with hinged type globe holder.
3. *Lamp*
The recommended lamp sizes shall be 2,500 lumens and 6,000 lumens.

(4) *Secondary Residential Areas*
Mast arm mounting on wood poles with enclosed type luminaire:
1. *Mast Arm*
The mast arm is to be channel type with rigid 1¼" stud or (for the congested areas) the trolley type of arm. Length of arms to be 12 and 16 ft.
2. *Luminaire*
The luminaire shall be a pendant type with concealed light source utilizing Alzak processed aluminum reflecting surface suitable for 2,500 and 6,000 lumen lamps with suitable insulator and equipped with hinged type globe holder.
3. *Lamp*
The recommended lamp sizes shall be 2,500 lumens and 6,000 lumens.
4. *Mounting Height*
The recommended mounting height is to be 20 ft. minimum and 25 ft. maximum.

(5) *Minor Residential Areas*
Mast arm mounting on wood poles with open type luminaire:
1. *Mast Arm*
The mast arm is to be channel type with rigid 1¼" stud, or (for the congested areas) the trolley type of arm. Length of arms to be 12 and 16 ft.
2. *Luminaire*
The luminaire shall be open type, 20" radial wave, porcelain enamel finish reflector, with suitable insulator and hood for 1¼" pipe tap.
3. *Lamp*
The lamp size shall be limited to 1,000 lumens and 2,500 lumens.
4. *Mounting Height*
The recommended mounting height is to be 20 ft.

A sixth type of lighting was indicated for special applications. This type applies to dangerous intersections and certain highways. Sodium lighting may be used at such locations.

The one item not specified is spacing. This, of course, will depend on the variables encountered on the individual streets considered and requires the cooperative effort of the utility engineers and the public officials for adequate solution. It is recommended that spacing-mounting height ratios as prescribed by the manufacturers be not exceeded.

As indicated above it is essential that any standardization plan include the proper cost analysis to determine its practicability and justification—is it economical to install? Is it economical to operate and maintain?

A cost analysis indicated that the above mentioned standardization of items will appreciably reduce the original cost of installation over most equivalent units now on our system and that it should also, to some extent, reduce the cost of maintenance and operation.

The problem of series versus multiple street lighting has been analyzed to a limited extent. Analyses thus far indicate that in our own case the multiple lighting systems are especially advantageous in areas where the lighting load totals 5 kva or less. For areas where the lighting load exceeds 5 kva a cost comparison is recommended if there is any question as to the type of system to be used. Normally in the upper bracket the series system is used except where we now have established multiple systems which will very likely remain in the event of any modernization plan for reasons of economy.

We are not ready to advocate the adoption of one system in preference to the other, but do call your attention to some items that apply to the Ohio Edison Company system:

1. The series system in grounded neutral primary areas is rapidly becoming a one-wire system.

2. The systems now in service are predominantly series systems.

3. The systems are predominantly straight series systems in the overhead supply areas.

4. The series system contains considerably less moving parts.

5. Transformer investment was allocated in the cost analysis of both systems.

6. Under the present proposal to sell lumens rather than candlepower and wattage the series lamps simplify the tabulation of rate schedules. At present, multiple lamps do not parallel the output of series lamps and vice versa. Having a great majority of series lamps in service naturally provides an advantage of established practice favoring them over the multiple lamps.

7. Series lamps have a more uniform rated lumen output during their life.

A number of disadvantages are recognized such as higher voltage units and corresponding added difficulties of operation and maintenance, film cutout problems, etc.

In connection with maintenance costs the item of glassware breakage is very significant. An analysis of our present installed glassware covering the years 1937 and 1938 indicates that the breakage on all upright mounted units totals 30-35 per cent annually, whereas the glassware breakage of pendant units in service totals less than 3 per cent. The 30-35 per cent figure is an average. Individual types will vary anywhere from 10 per cent to about 40 per cent We must recognize, of course, that there are several types of breakage — malicious, faulty design, faulty manufacturing and faulty installation.

Cost reduction is also evident in the establishment of a minimum number of parts and mounting arrangements, as follows:

1. Two sizes of mast arms are specified for externally wired overhead units, the 12 ft. and 16 ft. lengths—the 12 ft. for normal mounting between intersections and the 16 ft. for diagonal mounting at intersections.

2. One size of upsweep bracket (6 ft.) has been selected for internally wired units with universal application for ornamental post, steel pole or wood pole mounting.

3. Two sizes of ornamental posts have been selected for all ornamental applications normally encountered in our area. The posts were selected to provide adequate mounting height, adequate strength and of such design that they are less conspicuous on the street. Ornamental standards are most effective when they are least noticeable. They must blend in with the background. The type of post selected is also suitable for universal use with either overhead or underground conductors. We are encouraging the use of overhead conductors where permissible because of the added difficulties encountered in underground series circuits.

4. The glassware has been reduced to three stock items.

5. A substantial reduction in the number of fixtures was effected. Instead of the 30 types of fixtures now used, four plus the radial wave reflector are specified. This is quite a reduction considering that we accom-

modate all lamp sizes from 1,000 to 15,000 lumen.

6. Instead of 13 series lamps, 7 are specified.

Summarizing—instead of some 100 types of lighting unit combinations we now have 5 essential types with nearly maximum interchangeability of parts. We have reduced the multiplicity of parts of the 100 lighting unit combinations to 20 essential parts, exclusive of lamps.

It is surprising what standardization can accomplish when we really analyze the problem.

There are, of course, problems to be solved. The above plan assumes that the joint N.E.M.A. and E.E.I. street lighting standardization committee will agree to standardize on essential dimensions so that parts are interchangeable as between manufacturers. We assume that the above committee will solve the problem of heat damaging the cable entering the fixtures of the larger sizes of lighting units. We assume also that the above committee cooperating with the appropriate IES committee will coordinate the lumen output of series and multiple lamps so that duplicate rate schedules can be avoided.

In addition, there are some major problems to be solved as indicated under the reference to light conditioning of our streets. We lack some essential data pertaining to the effect of the general street lighting assemblies on our vision as this ability to see is affected by varying conditions of traffic flow, traffic speed; weather variations, types of pavements employed, object exposure, etc. Such problems require energetic research, experience, cooperation, education and determination.

Any improvements in the art will very likely include more efficient optical systems and light sources. Insofar as it is possible such development should be adapted to existing units rather than attempting the opposite plan followed so extensively in the past.

Our street lighting standardization plan is now complete except for one important step. We must sell the plan to the city or to the political body concerned. All of our elaborate reports and recommendations will accomplish exactly nothing if we fail to convince the public of the soundness of our plan, and if we fail to prove to them that the adoption of such a plan will provide more useful lighting per dollar invested by them. As was illustrated very clearly in a newspaper article appearing recently in one of the large cities, we must convince the public that they pay for light conditioning of streets and highways "whether they have it or not."

To corroborate this statement the following published claims are presented:

In Detroit, the night fatalities were reduced by 77 per cent on 31 miles of streets. In Syracuse, it was indicated that 50 per cent of the total accidents are due to poor illumination and that the fatalities during the four evening rush hours exceed by 280 per cent fatalities during the four daytime rush hours. In West Hartford, Connecticut, improved illumination on 14 miles of streets resulted in 46 per cent fewer accidents, or a net saving of three and one-half times the annual lighting cost, excluding the evaluation of the reduction in fatalities and crime.

In general, main thoroughfares are ten times more dangerous at night than in the daytime and the degree of visibility is directly related to the number of accidents. More concretely expressed, the cost of *not* installing adequate lighting is often three times the cost of light conditioning. We spend hundreds of millions of dollars on grade elimination projects, yet we find that during 1935 grade crossings accounted for only one death to every 15 caused by automobiles during the hours of darkness.

In this connection, it is suggested that the presentation of the standardization plan to the public body concerned include a light conditioning plan for every street and highway within the jurisdiction of such body—an ultimate plan to work toward gradually—but let us have a plan, not a hodgepodge. Such proposal should include an analysis of traffic, traffic hazards, street surfaces, street widths, obstructions such as trees, and all other items which may affect the final plan. The objections to such a plan on the basis of political expediency can certainly be answered in the saving of human lives.

If we are to obtain wholehearted community support it is essential that we cooperate with the various public interest associations and service clubs, such as the National Safety Council, traffic bureaus, Automobile Clubs and local service clubs, including the Junior Chamber of Commerce. The latter body has made very substantial progress this year in their "Safety With Light" program which deserves our active support.

Naturally, it is our responsibility to initiate such a plan in just the same manner as we present reports on economies to be effected in other phases of our business. There is an added responsibility—that of saving human lives—in spite of the present-day trend. We have an excellent opportunity to offer a real service to our municipalities, and if presented in all sincerity and fairness, such efforts will undoubtedly enhance our standing in the communities we serve.

Load Building

(*Continued from page 576*)

off-peak loads, if they become large enough they then become on-peak loads. Hence, the danger of making off-peak schedules without proper consideration of all factors. With off-peak water heating limited to small size heating elements this danger is remote, although not eliminated.

From the foregoing one cannot help but reach the conclusion that increasing the average consumption by load building activities is to the good of both the customer and the utility. By so doing, the utility is rendering more complete service and is able to reduce the average rate charged and because of this the customers are able to secure a great deal more for their money. In other words, it is a sort of merry-go-round; an increased use results in a lower average rate which is reflected in the customer's bill, this again being an incentive for him to increase his use. Just how long this process can continue before the reverse trend occurs is somewhat problematical but it is safe to say that we are not yet close to that point.

What is the reason for all this load building discussion and activity, anyway? Why are we, as electric utility men, interested in seeing our average use per customer increasing? Some will say we are doing so because of selfish reasons. We wish to build up our business and increase revenues. I think that there is more to it than that. I think each one of us feels happier when some individual becomes the possessor of an electrical appliance which will lighten burdens. Happiness which these various electrical devices bring into the home with them is not to be overlooked. To my way of thinking, giving the household manager more leisure time in which to improve her mind contributes more to the well-being and higher standard of living in this country than many other of our much-publicized American achievements.

All Service Commercial Mass Selling

By A. G. Garrigues

Director Retail Sales, Philadelphia Electric Company, Pa.

Presented at General Sales Conference, Southeastern Electric Exchange, Atlanta, Ga., Nov. 3, 1939.

SEVERAL months ago a man came into my office with more information about the tires on my automobile than I had myself. This man was a good salesman. He proceeded to paint a word-picture of the great importance of reliable tires and inner tubes on an automobile. He brought to my eyes the horrible results that can come from a blow-out. On two separate visits he did this, and after going through this harrowing experience twice, I finally broke down and gave the man a check for some thirty odd dollars for safety inner tubes. He must have been a good salesman to persuade me to part with a check for $30.

Now when this man left the office with my check he and his company were in a position to determine accurately the net profit or loss on this sale. They knew the cost of making the sale and they knew exactly what they got for it —providing, of course, that my check was good. It is true that the service which these inner tubes have given me will have a real bearing on whether or not I purchase any other tires from this company, but the fact remains that this transaction was complete when the tubes were placed on my car and payment was made for them.

Now if we contrast this sale with that made by a utility commercial salesman we have a very different picture. He calls on a prospect to sell an electric fry kettle, for example. He has information as to the size of this prospect's present electric bill. He knows fairly accurately how many customers this prospect serves in his restaurant each day. He has actually eaten here when he has been in the neighborhood. He has sales data and operating data on kettles in similar locations. He is able to make a clear presentation of his case and even goes so far as to demonstrate the kettle to show the kind of product it will turn out. After several calls he succeeds in making the customer understand the real advantages of frying electrically and the customer decides to buy. He buys the kettle from a dealer. A sale has been made—there is no doubt of that, yet no profit has accrued to the utility company which employs this salesman. At this point the sale is entirely an expense to the utility. The chances of obtaining a net profit from this sale, or even a gross profit, for that matter, are determined entirely by the amount of use this fry kettle is put to by the customer. If for any reason this customer does not use this fry kettle no financial advantage has been obtained from this sale by the utility company. This example shows several things—

1. Our customer's continued prosperity is more vital to us than his present decision to add to his utilization equipment.
2. Our customer's lasting attitude toward the value of the equipment as a profit builder for him is of as much concern to us as the closed sale.
3. The possibility of this equipment serving the customer well over a long period of time is essential to our benefitting from the sale.

In short, the customer's recurrent decisions to use the equipment are the decisions on which our sales activities must focus, not alone the decision to purchase this merchandise. For these reasons our sales attention should be directed toward the customer and his needs rather than toward the sale of a specific item of utilization equipment. It is this reasoning that has led us in Philadelphia to the form of organization and methods which we use in covering both our industrial and commercial markets.

Our commercial, or retail market in the city of Philadelphia consists of approximately 93,000 electric customers. In this area gas is supplied by the Philadelphia Gas Works Company. In the suburban territory around Philadelphia which the Philadelphia Electric Company serves with both gas and electricity, we have an additional 26,000 electric customers. This market of 119,000 customers is large in number and obviously requires man power to get complete sales coverage. For several years we have been feeling our way to determine the required man power. Our first approach was, of course, to cover only the larger of these customers where the greatest potentiality for sales increases appeared. A little over two years ago we conducted a field survey which indicated that the smaller customers also had potential uses far in excess of their actual uses. We expanded our force in the latter part of 1937 in an attempt to cover this market more adequately.

Much has been said about the unprofitable customer as a sales problem. Our approach to this problem was based on finding that this smaller customer, whether or not he was unprofitable, represented a possible user of more kwhr and was next door or down the street from the larger customer. Thus greater coverage and quick selling methods would serve our purpose better than picking out these small customers as a different sort of animal and giving them special treatment. This affected the way in which we were to set up our organization. The requirements for this organization seems to be—

1. Intelligent, thorough selling with some of the technical approach of the power salesmen.
2. Quick coverage and complete selling such as is done in our merchandising organizations.
3. Controlled, carefully directed selective selling.
4. Co-operative approach to the dealers' sales problems in the territory.
5. Protective selling giving full recognition to value to us of existing loads and existing customers.

To fill these requirements we have developed the following organizations:

	In City of Philadelphia	In Suburbs	Combined	Number of Customers per Man
Retail Salesmen	24	14	38	3132
Retail Contract Men	8	6	14	8500
Sales Promotion Men	—	—	8	14875
Supervisors	3	4	7	17000
Total	35	24	67	1776

This means little without an explanation of the duties of each group of men.

Group I. The territory is divided into 38 sales areas, one retail salesman is assigned to each area with full responsibility for the sales in his own territory. It is his job—

1. Call on the customers in his area systematically.
2. Learn to know the customers individually and their needs.
3. To sell the customers the reality of these needs and the method by which these needs can be served.
4. Co-operate closely with the dealers and contractors who merchandise and install the equipment.

Group II. It is the duty of the contract (routine) men to attend to all of those routine matters that arise in connection with placing new customers on the lines, and increasing the size of meters and services. A large portion of the time of these men is devoted to new residence connections.

Group III. The eight sales promotion men are assigned to specific applications as follows:

3 Lighting
2 Commercial Cooking
1 Electric Advertising
1 Heating Applications
1 Air Conditioning & Ventilation

It is their job —

1. To keep up to date on the various types of utilization equipment in their line.
2. To assemble operating data and sales helps.
3. To develop advertising plans in co-operation with our advertising department.
4. To cultivate the co-operation of manufacturers and jobbers.
5. To arrange co-operative all industry sales campaigns at specified intervals.
6. To assist the Retail Salesmen in the field as called for by the salesmen.

Group IV. The activities of our seven supervisors are varied. One of the three in Philadelphia devotes all of his time to supervising the eight contract men and helping them work out the knotty service problems. The other two Philadelphia supervisors spend between 60 and 90 per cent of their time in the field with the retail salesman, helping the men to sell, teaching the men, and becoming acquainted with the individual characteristics of the territories, customers and salesmen. They are absolutely essential to the intelligent direction and supervision of this sales activity.

The four suburban supervisors are assigned to each of the four suburban divisions and have the supervision and direction of the contract men, the rural salesmen and the retail salesmen, and by the very nature of their assignments can give less attention in the field to the retail salesmen.

I will confine my discussion of methods to the City of Philadelphia activity because this market of 93,000 customers provides such a wide variety of types and conditions of customers and since the methods used in this part of our sales organization are in the main the same as those used in the suburbs.

Until about two years ago the size of our sales force limited our canvassing to the larger customers—the cream of the market.

As I have stated, a survey was made in 1937 which indicated that the possibilities of increasing the use by the smaller customer were very real if we could get quick coverage and quick selling. Near the end of 1937 we doubled our Philadelphia sales force to a total of 20 salesmen and two field supervisors. Later we increased the number of salesmen to 24, which is our present number.

The matter of choice of salesmen is, of course, a most important one. To be of real value in this work the men must be above the average in intelligence, must be energetic and ambitious. They should not be too young nor too old. We try to confine our choices to men between the ages of 25 and 35. There are other requirements. They must know or learn as quickly as possible much about company policy. They must know or learn as quickly as possible much about a large variety of utilization equipment. They must have pleasing appearance and pleasing personality, and they must have that intangible quality, a power of persuasion which includes all of the things which I have just mentioned, and the ability to understand each customer and anticipate his reactions.

This larger force alone could not in itself be counted on to get the coverage of the smaller customers that we felt necessary. It was necessary to find some means of opening the eyes of each individual salesman to the sales possibilities among these smaller customers. Of the 90,000 commercial customers nearly four-fifths, or about 70,000, had billing demands of under 2 kw. These are neighborhood stores, small offices and small restaurants which had been passed by on account of inadequate man power. In 1936 only 439 sales of equipment, or 24 per cent of all of the sales of equipment were made to the customers whose demands were under 2 kw, yet this group represented four-fifths of our market in number of customers. To get this coverage we had our Billing Department prepare a card for each one of the 90,000 customers. We assigned 20 of these cards to each salesman each day. Twenty cards is more than a man can cover in a day together with his follow-up work, but we were assured by this method that the men had sufficient canvass calls to make. This plan of directing the canvassing has been in use for nearly two years with very satisfactory results. A salesman loses, to some extent, his initiative if he is deprived of the opportunity of using his own discretion in matters such as planning his own days' work. We, therefore, allowed considerable latitude in the use of this canvass plan, but kept all men in line sufficiently to obtain a very good percentage of regular canvass calls each day.

We have regular morning meetings at which the reports of the sales of the previous day are made by each salesman. At this time any matters of interest are brought up by the supervisors or myself. It is hard to tell which is more difficult, the job of thinking of something to say at the daily morning sales meetings or the unpleasant task of the salesman who has to sit through these long talks and look interested. For this reason we seldom have such talks at these meetings. The object of these meetings is—

1. To create a friendly feeling of competition by placing before all the men at once where they can see for themselves the accomplishment of each of the men and each of the supervisory groups.
2. To provide a means of getting to the whole group such information as may be most easily passed on that way.
3. To create a group spirit among the men and send them out each morning in the proper frame of mind.

Each supervisor leaves with a different salesman in his group each morning to call on this salesman's customers. This practice serves as a means of helping to give the salesman the training he needs and also makes it possible to make a comparative appraisal of the sales qualifications and development of the salesmen.

We have used various methods of training, such as short schools on lighting, cooking, air conditioning, metering and wiring and other pertinent subjects. Monthly departmental meetings are held covering appropriate subjects. The salesmen, of their own volition, with the encouragement of the department heads, have organized a Forum for the study of problems connected with their sales work. The voluntary feature of this has made this method very effective. Most of the men have been given the General Electric LaSalle Lighting Sales course.

Another help in the training of the men is the use of cooperative campaigns, where the salesmen become better ac-

quainted with the dealers and devote more than the usual attention to the sale of specific equipment.

Our sales work falls into three distinct processes:

1. The daily coverage and cultivation of the existing customers in a systematic canvas.
2. The development of an active prospect list for a great variety of applications, and follow-up of these prospects, including equipment demonstrations where possible.
3. The co-operative campaigns.

These campaigns running for periods from 1 to 3 months are planned in co-operation with the manufacturers of utilization equipment, preferably through a Committee of the Local Electric Association. The utility makes a contribution of a large portion of the cost of the campaign and each cooperative manufacturer is asked to contribute his portion of the balance of the cost. Advertising is sent to a carefully selected mailing list on a weekly schedule throughout the campaign. This advertising is followed up approximately five days later by a call from the utility salesmen. Prospects developed from this list are made available in rotation to the co-operating manufacturers who in turn pass them on to their dealers for further follow-up with or without the utility salesmen, according to the circumstances of the individual case. Our schedule of such campaigns for the year 1938 was as follows:

Application	Date	Number Customers	Number Co-operating Mfrs.
Industrial Lighting & Miscellaneous	1/5 to 3/12	1250	5
School Lighting	5/2 to 9/12	500	4
Air Conditioning & Ventilation	5/11 to 7/15	1700	7
Elec. & Gas Water Heating	7/23 to 9/8	1000	4
Commercial Cooking	9/10 to 12/15	2500	9
Commercial Lighting	9/10 to 12/15	1200	6

The propelling force of a good sales organization is initiative of the individual. This is a hard thing to stimulate. There is always a great temptation to govern the salesmen's activities by rigid rules. Some rules are, of course, necessary, but I think you will agree that the initiative of the individual varies inversely with the rigidity with which his activities are directed. Therefore, wherever we could substitute a positive stimulus in the right direction in place of a rigid rule we have tried to do so.

This approach led us to develop the use of a continuous incentive plan about two years ago. The object of this plan is to get each week's work done by each man on time and reward good performance. Before outlining this plan I should point out that all of our salesmen are on a straight salary basis.

At the start of each quarter a prize fund is established based on the attainment of the departmental quotas. The size of this fund varies with the percentage of quota obtained during the quarter. From this fund it is possible for each salesman to obtain certificates with a par value of $1 for various performances specified in the announcement issued at the start of the quarter. These items for which certificates are offered have been changed from time to time and they may be changed in any quarterly announcement. One of the most effective offers in our incentive plan has been the offer of one certificate at the end of each week to the salesmen who have obtained the portion of the month's quota equivalent to the portion of the month elapsed. This makes it possible for the salesman to get four certificates in a month's time by being up-to-date in his sales at the end of each week during the month.

In addition to this continuous incentive plan the salesmen are offered prizes as a part of the competition in our co-operative sales campaigns.

I have tried to present a picture of some of the things which we have done in an attempt to build our commercial sales intelligently. With this outline of a larger organization and, of course, greater expense, the burden is placed on me to give some indication to you of whether the results have justified this expansion. For this reason I feel called on to present some of the studies we have made along this line.

1. Our reported sales in the City of Philadelphia in 1938 exceeded the reported sales in 1937 by—

3349.5 KW, or 64.5%
4,155,529 KWH, or 63.7%
$109,152 in Estimated Annual Revenue, or 42.2%

Now I have stated that we increased our personnel by 100 per cent, and it will be observed that this increment load was not in proportion to the increase in personnel. This, of course, was expected, but we have found in our analyses that the cost of obtaining the increment revenue was in line with our estimates prepared in advance and it seems satisfactory.

It will be observed that the revenue did not show the same percentage increase as the kilowatts sold. This is accounted for by a rate reduction which was effective in November, 1937.

2. These increases were a direct result of broadening our market. In 1937 we studied the sales of equipment other than lighting for the year 1936 and found the number of customers to whom equipment had been sold whose demands were below 2 kilowatts and the number of customers whose demands were above 2 kilowatts. We repeated this study for the year 1938, which was the first year in which we had directed our attention systematically to the lower revenue group. A comparison of the results is interesting:

	Sales made to customers with demands under 2 KW	
	No.	% of total sales
1936	439	24%
1938	2730	69.2%
	Sales made to customers with demands over 2 KW	
	No.	% of total sales
1936	1396	76%
1938	1213	30.8%

It will be observed that while the number of sales to the larger customers fell off slightly the sales to the smaller customers were over 6 times as great in 1938 as in 1936. In 1936 each sale brought an average increase of .93 KW. In 1938 each sale brought an average increase of .85 KW. This indicates that in selling the smaller customers we had to be satisfied with a smaller unit of sale, which is understandable.

For several reasons we were unable to make a similar comparison for the sales of lighting which were made by the same men, but from our observations we are convinced that the development of the smaller customer has followed the same trend in lighting as the other equipment.

3. Our estimates of annual kilowatt hours and revenue increases as made in our sales reports have been borne out in the various spot checks which we have made to determine the accuracy of our sales reports. Further, our increases in kilowatt hours metered exceed by a safe margin our estimated increases as reported in our sales reports, in spite of a decided drop in retail trade in the Philadelphia area during the year 1938.

4. The growth of our sales as shown in the comparisons of 1938 with 1937 seem to be continuing as we continue to perfect our organization and methods. The year 1939 to date shows an increase over 1938 of approximately 20%.

In conclusion I would like to summarize some of our observations in attempting to sell this commercial market:

1. The sales approach must cater to the needs and expansion of the customer rather than the sale of a pre-determined list of items of utilization equipment.
2. As the smaller customers are approached we can expect smaller increment loads from our sales efforts, thus requiring greater speed in selling.
3. The type of problems met in this work require high grade salesmen and careful supervision.
4. Co-ordination of direct-by-mail advertising, utility salesmen's activities and activities of equipment sales outlets is essential.
5. The salesmen must be relieved as far as possible of routine work and must be backed up by men with preparation and time to follow through more complicated sales jobs. In addition to this we have found it very helpful to have rate analysis work and complaint problems handled by a separate group.

Finally, this is a large and important market with great potentialities for development, and is therefore worthy of careful analysis and thoroughly planned and aggressive selling.

Keeping the Pace

By C. E. Greenwood
Commercial Director E.E.I.

THE month of December is review time, but the summation of accomplishment indicated in this review is of greatest value in guiding our future course of action. Statistical information on sales results is not available at time of writing, but we know that generally 1939 has been a much better year than 1938 in business building. Our blueprints therefore will show plans to speed up progress and continue the benefits of industry action in forwarding aggressive sales effort.

Wiring

Reference to adequate wiring as a "bottle-neck" in successful load-building is a common one. There have been two major contributions in 1939 for hurdling this obstruction. The promotion of the Adequate Wiring Bureau has made rapid strides in directing local attention to the need of greater copper capacities, and it has mobilized all branches of the industry in pushing sales of better wiring, more outlets and more wiring materials. The other major development in the wiring field has been the splendid work of the Wiring Committee of the utility industry in forwarding new developments in wiring materials and methods to make it easier for the consumer to have more copper capacity at reasonable cost. There has never been the time when the utility company was not sympathetic to wiring contractors obtaining fair prices and on insisting upon quality work. They now want to encourage the use of materials which will loosen the purse-strings of the buyer of wiring, give him the safe and adequate wiring capacities and yet allow the contractor as equally fair a profit margin for his labor as when older materials are used.

Information on the three wiring booklets which have been given wide circulation has been broadcast in the columns of the BULLETIN and many other trade press media. There is one which deserves special mention here which confines itself to commercial wiring and the possibilities in the use of thin-wall insulation material. This is now to be recognized in the National Wiring Code, and thereby a new and extensive field in the rewiring of commercial and industrial structures is opened for the benefit of the industry. This means the "bottle-neck" has been expanded to some degree by the hard work of far-seeing men in the industry. It offers a ray of hope for future developments which will benefit the public, a benefit which will be reflected in our industry.

The Dealer

Wiring may be the "bottle-neck" in the sale and use of electrical appliances but the dealer is the "bottle-neck" in distribution. There could be no meeting of any group of manufacturer representatives or utility men to discuss markets without attention being given to the dealer welfare. As your dealer functions, so goes sales volume of all products.

Several years ago when the utility company was the chief factor in the scheme of direct selling, the merchandise department was called upon to perform the unusual in sales results. For example, when rate reductions occurred, there was pressure to move the sales curve sharply upward in order to help cover losses in revenue. Interest could be stimulated readily in the commercial department of the company to do the job.

But the situation changes as the direct selling is turned over to the dealers in a community. When there is a reduction in the residence rate of the utility company, a natural stimulus for selling is created. Volume sales increase in proportion to the degree and method that the advantages to the public are publicized. The company selects equipment on which to place the pressure.

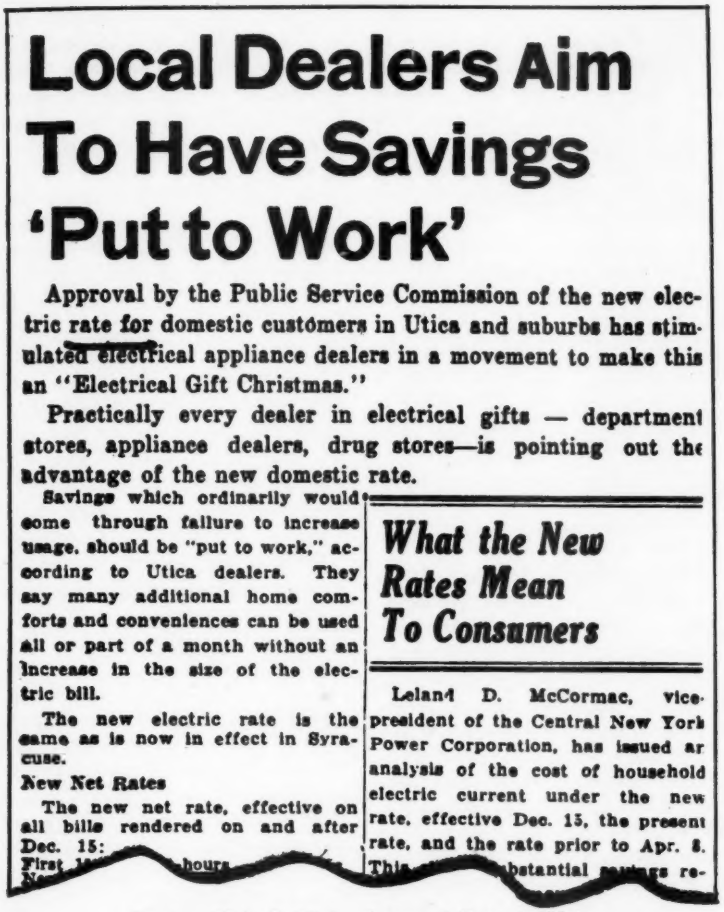
Opportunity is then offered for dealers to cash-in, and to show their side of the cooperation picture. Which is a reminder that the recent approval of the new electric rate for domestic customers in Utica, N. Y., is being used as a stimulus for electrical appliance dealers to sell electric gifts for Christmas. Publicity in the newspapers was headed LOCAL DEALERS AIM TO HAVE SAVINGS 'PUT TO WORK.' All dealers—the department stores, appliance dealers, drug stores and others are pointing out the advantages of the new domestic rate of the utility company to householders. It is emphasized that many home comforts and conveniences can be used for part of a month without an increase in the size of the electric bill.

Utica dealers say: "Savings which ordinarily would come through failure to increase usage should be put to work." Coupled with the dealer publicity is that of the utility showing what the new rates mean to consumers. It appears that the dealers in that community will make good on this opportunity through their effort to function in helpfulness to the company and themselves. There will be no question of the increased customer interest in buying.

For the past several years, and increasingly so in 1939, the dealer has been helped and encouraged by the utility companies to a varying extent of helpful cooperation. One has only to review some of the Dealer Plans of utilities and the increasing percentage of total volume of business done by dealers to come to a full appreciation that the dealer plays in the scheme of marketing. This is a challenge to the dealer group.

National Advertising and Publicity

Now dealer interest and action are basic in the success of National and local coordinated advertising and selling which has been a feature of the utility industry over the past decade. From time to time inventory is taken of what is happening in these developments. The Adequate Wiring Bureau sponsored by NEMA; Better Light-Better Sight; Modern Kitchen Bureau; Electric Water Systems; Commercial Electric Cooking—are all examples of the possibilities. Both the Running Water and Commercial Electric Cooking Programs are making gratifying progress. The oldest and best known of the quintet is the national lighting activity. The Executive Committee met in Cleveland this past month to outline the course of



Local Dealers Aim To Have Savings 'Put to Work'

Approval by the Public Service Commission of the new electric rate for domestic customers in Utica and suburbs has stimulated electrical appliance dealers in a movement to make this an "Electrical Gift Christmas."

Practically every dealer in electrical gifts — department stores, appliance dealers, drug stores—is pointing out the advantage of the new domestic rate.

Savings which ordinarily would come through failure to increase usage, should be "put to work," according to Utica dealers. They say many additional home comforts and conveniences can be used all or part of a month without an increase in the size of the electric bill.

The new electric rate is the same as is now in effect in Syracuse.

New Net Rates

The new net rate, effective on all bills rendered on and after Dec. 15:

First [illegible] hours

What the New Rates Mean To Consumers

Leland D. McCormac, vice-president of the Central New York Power Corporation, has issued an analysis of the cost of household electric current under the new rate, effective Dec. 15, the present rate, and the rate prior to Apr. 8. This [illegible] substantial savings re-

Dealers Help Publicize Lowered Rates in Utica
(From an article in *Utica Press*)

procedure for 1940 which will register its seventh year of action.

Now for Lucky Seventh

Better Light-Better Sight has reached a stage of maturity and nearly universal acceptance where a large percentage of utilities automatically place it among the major operations when considering commercial department programs for a new year.

In fact the momentum of six years of success and progress has placed the movement at the top of the list as the longest sustained commercial and educational activity in the history of utility national coordinated programs.

At this time it appears Better Light-Better Sight will maintain its position and continue its stride in 1940 as the very flexibility of the movement with its broad educational aspects and numerous commercial opportunities makes it applicable and workable in the plans and desires of every utility throughout the country.

The Better Light-Better Sight Bureau will endeavor to provide suggestions and new materials to help stimulate further public interest and acceptance. The Bureau's plans, still in the formation stage, will include among other things a continuation of The Dawn of a New Day theme—a new booklet on the "Fundamentals of Seeing," suitable for distribution to people in all walks of life, professional as well as layman—a dramatic sound slide film incorporating the principles of Better-Light-Better Sight, its growth, acceptance and recent developments, all designed for presentation to local groups and meetings—a periodic supplement to the *news* to include strictly educational items and information for wide local distribution at low cost—a skeleton Speakers' Bureau to provide authoritative and inspirational talks to local groups and meetings—special plans and materials for participation in the Optometrists' annual "Save Your Vision Week"—as in the past a sound slide film for schools —and several display materials of various kinds.

Modern Kitchen Bureau

Donald Duck, of world-wide movie renown, has been drafted by The Modern Kitchen Bureau to symbolize its 1940 Electric Water Heater program. Donald will be the central feature of the campaign and will step forth in the leading role in all of the Electric Water Heater campaign's promotional materials and advertising.

The backbone of "Donald's" campaign will be a series of national advertisements, to appear every other month, commencing with the February issue, in *Better Homes and Gardens*. This series brings Donald right into the consumer's home, and permits him to tell his story in person, bringing forcibly to Mrs. Homemaker's attention all the advantages and benefits she will gain by installing an electric water heater in her home.

Just to make things exciting for everybody in true Donald Duck style, the campaign includes a series of contests to stimulate the enthusiasm of everyone within the industry. There is a contest for the best window display of electric water heaters, giving the display manager a chance to test his skill and versatility with others throughout the country. A contest for the best newspaper advertisements provides a similar opportunity for the advertising man. There is the salesman's letter contest, which offers its prizes for letters on "The Toughest Electric Water Heater Sale I Ever Made." This is a contest which will gather for the benefit of the entire industry a great many worthwhile ideas on selling water heaters.

Above all, there is the contest for the best all-around job on electric water heater promotion by any utility company, with three prizes totaling $1,000 and plaques to signalize victory. This contest, also, brings forth a host of valuable ideas and suggestions for the use of other utilities, and ranks as one of the most important projects throughout the industry. Its winners will achieve national recognition.

Donald Duck will appear as the campaign emblem on all campaign material. There will be a Donald Duck window banner and four Donald Duck display sheets, the latter furnished with easels if desired. Two direct mail pieces will provide another means for letting Donald tell his Electric Water Heater story right in the home. Five newspaper ad-

vertisements are provided, in two different sizes, to fit any need. In the booklet which is designed both as a sales training manual and for consumer reading, Donald Duck takes the reader through the whole electric water heater story from start to finish, emphasizing one point of advantage after another until every point has been covered effectively. Finally, there is a complete series of radio announcements which can be adapted for local use.

Electric Range Program

Another program of the Modern Kitchen Bureau for which details have been completed is its Electric Range Revue, a forceful campaign for the promotion of the electric range which can be put into effect at any time best adapted to the utility's local situation.

This program will have the support of national advertising in *Better Homes and Garden,* in *McCall's Magazine,* and *The Saturday Evening Post.* The advertisements, running throughout the year in one or another of these publications, will build a firm platform for local range activities in every section.

Promotional materials include a plan folder, window banner, six posters, two direct mail folders, a letterhead sticker, reprints and blow-ups of the national advertisements, six newspaper advertisements available in mat form, and a series of radio announcements. The window banner, in full-color Kodachrome photography and the display cards in four colors, are especially effective, and can be counted on as sure traffic-stoppers wherever displayed. The entire series is the most colorful assortment the Bureau has ever produced.

Electric Refrigerator Campaign

"Twice the Value at Half the Cost" is the theme of the Bureau's electric refrigerator program. This slogan is applied throughout the promotional materials in drawing comparisons between the 1940 refrigerators and refrigerators of earlier vintages. Readers are shown the vast improvements that have been brought about in the models for next year, and their definite economies both in purchase price and operating costs.

The plan book for the 1940 Electric Refrigerator Program supplies a complete outline of the sales campaign and tells exactly how it can be set up in any community. A contest for retail salesmen is included, and this can be used as described or adapted to local conditions.

A wealth of effective promotional and advertising material has been prepared for this program. It includes a big window banner, six attractive display sheets for use on walls, in window or on counters, a 24-sheet poster, a compelling consumer folder, a series of radio announcements, and a series of newspaper advertising mats.

These newspaper advertisements are the central feature of the campaign and the key portion of it for utility companies, for which they have been particularly designed. They emphasize the 1940 refrigerators rather than refrigerator gadgets. Copy and illustration is feminine in appeal and technique, and sell in the emotional manner which is the current vogue among successful advertisers.

Electric Roaster Program

A complete plan, fully detailing the method of conducting an electric roaster compaign, will be ready soon after the first of the year. With it will be a complete set of newspaper advertisements, display materials, mailing pieces, radio announcements and everything else needed to tie-in with the extensive advertising of the manufacturers and make it more effective. The manufacturers are scheduled to spend more money than last year in more National magazines but over their own names.

All-Electric Kitchen Program

The Bureau continues its educational all-electric kitchen program with new and effective material designed to sell the modern woman on the many advantages and benefits which the all-electric kitchen confers. A counter card, two self-mailing folders, envelope stuffers and a booklet on kitchen planning are sure-fire prospect-getters for dealers and utilities.

There is profit in these campaigns for every utility that uses them, whether they are put into operation by the sales department alone, by affiliated dealer organizations, or in combination of the two. They provide opportunity for carrying on special promotions at intervals throughout the year, and are a valuable means of stimulating the entire sales organization and keeping it up to pitch. There is every reason to believe that more utilities will make use of the Modern Kitchen Bureau's programs for 1940 than ever before.

Customer Relations Course

When we are appealing to our customers for more business, both in the commercial and industrial fields as well as the domestic, it is fitting that we study our contact with the public to determine how they may be improved. What is said and done by an employee in one department may obstruct the sale by another. What does the public think of the men with whom they are dealing? How well does the employee know his job, and is he satisfactorily representing the management of the company?

It was with this thought in mind that a course in Customer Relations was recently prepared by the Sales Training Committee of our Institute in conjunction with Vocafilm Corporation. Five sound slide films, together with a Leader's Manual constitute the course which will enable management to visualize the instruction that it is continuously attempting to impart to the employee.

This course is now offered to the operating utilities with opportunity afforded for a trial in many cities.

Coming Events

Time and space do not permit for comment on a score of other commercial subjects under study of committees. The expansion of our Electric Water Systems Program to include a Certification Plan for pumps which will guarantee quality and service to the consumer is "in the works;" the Plan Committee of the Commercial Electric Cooking Council is poring over material to serve as business-getters in 1940. Two new important industry efforts are being discussed and may be ready for announcement next month. The Lighting Sales Committee has published its report on *Highway Lighting* and in the print shop is the report on *Fluorescent Lighting* to supplement the publication of last April.

The Air Conditioning Statistical Report has had wide and favorable acceptance.

The report of the Power Committee on *Electric Metal Melting Furnaces* should be ready for distribution shortly after the BULLETIN reaches its readers. We will not attempt to enumerate all of the service items. Suffice it to add that the commercial forces of the industry will enter 1940 at top speed.

Seventh Annual Sales Conference

Put it down on the calendar now. The Seventh Annual Sales Conference, E.E.I., will be held at the Edgewater Beach Hotel the week of March 18th. This is the time to record the date in your schedule.

A New Plan of Rewriting Meter Reading Sheets

By L. A. Mayo
The Connecticut Light and Power Company

An address before the Third National Accounting Conference, Edison Electric Institute, Chicago, Illinois, November 13, 14, and 15, 1939

THE rewriting of meter reading sheets has confronted utility accountants for many years and will continue to be a recurring problem until plans are perfected to eliminate them. In spite of the progress made through the years toward the simplification of this work, whereby laborious hand methods have been partly replaced by machine applications, the rewriting of these sheets is still an expensive job, and, if not accurately done, a potential source of complaints from customers.

It might be well to briefly consider the magnitude of this problem so as to emphasize the possibilities of savings that can be made together with improvements in customer relations.

There are approximately 28 million electric meters on lines in this country. Of this total, 25 million are owned by private utilities and about 3 million by municipal companies. Actual data is not available, but probably 90 per cent plus of the meter readings, or about 25 million, are on meter reading sheets, with an average life of from two to three years. If it is assumed that five postings must be transcribed from the old to the new sheets every two years, it is obvious that this volume of work alone will result in 125 million postings each time the sheets are rewritten.

But this is not all the story. A work volume of this magnitude requires thousands of hours for completion. The number of forms and other supplies required, together with the equipment and machines utilized, represents an incalculable amount of money. In addition, transcription accuracy is essential if subsequent complaints due to errors are to be minimized.

In these days, with a limited number of hours in a work week, when overtime must be paid at a time-and-a-half rate, and when utilities are striving to reduce expenses to offset the rising costs of doing business, the problem of rewriting meter reading sheets is one to challenge the ingenuity of utility accountants.

Many plans have been developed for the rewriting of meter reading sheets. Some companies follow the "periodic plan" whereby a number of sheets are rewritten each year during certain months or transcribed all at one time when the sheets expire. Other companies use the "continuous plan" under which a number of sheets are transcribed yearly over the life of the forms, in accordance with a predetermined schedule. Various bonus plans have also been adopted as an incentive to greater accuracy and lower costs, but, even with the progress made, this job continues to be an unavoidably expensive operation.

This paper describes a new plan of rewriting meter reading sheets which has been developed in our company during the last four months. This procedure utilizes the "numeric" punched cards, the tabulating machines and the addressograph plates of the customer billing department, with a new transfer posting machine now available from a prominent accounting machine manufacturer. The main features of the plan are accuracy, low cost and speed of transcription, on forms of varying designs and colors representing different classes of service. Most of the billing data on the old meter reading sheets, which is the same as the data punched into the "advance" billing cards and that shown on the addressograph plates, is transcribed mechanically. Special notations or instructions on various sheets must, of necessity, be transcribed manually.

At this point, a brief picture of the company setup may assist you in better visualizing the application of this rewriting plan. In our company there are about 240,000 electric, gas and water meters requiring 197,000 meter reading sheets. This total is made up of 185,000 active and 12,000 inactive sheets. The life of these sheets varies with the class of service involved. There will be 110,000 combination electric and gas sheets with a four-year life, 70,000 single service sheets for a six-year period and 20,000 commercial and power sheets with demand meters will run for two years.

The meters are read in 956 route books which are grouped in 21 billing cycles. About 45 route books represent one day's work in the centralized billing department. As previously stated, billing is done by "numeric" punched cards and tabulating equipment and the bills addressographed from plates.

If you will refer to the exhibit accompanying this paper, you will get a concise picture of the procedure we will follow, beginning on Dec. 1 of this year. You will note that the main steps of transcribing from the old to the new meter reading sheets are:

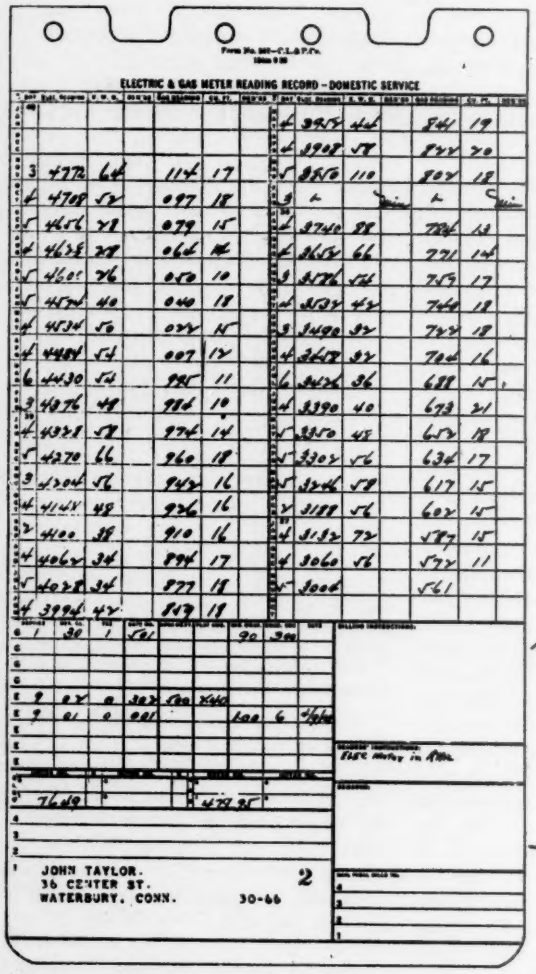
1—Addressographing new sheets.
2—Tabulating the billing data from the punched card to the master sheet.
3—Running the master sheets and new route sheets through the transfer posting machine to transcribe data mechanically.
4—Copying special instructions and notations to new sheets manually.

A schedule was prepared to rewrite all sheets in a two-months' period. This schedule provides for an equal work volume each day and is so arranged that all books from a certain number of offices will be rewritten within one month. All meter books of one billing cycle will be completely transcribed in one working day.

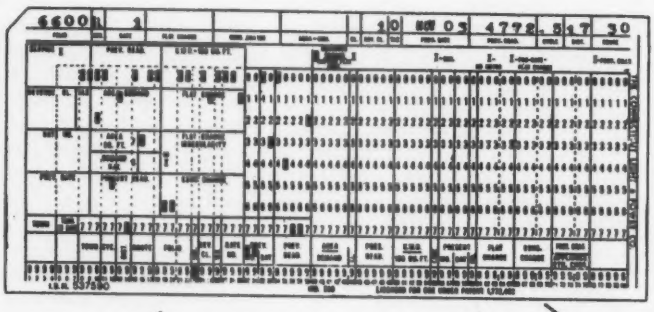
The new meter reading sheets will be addressographed when the meter books are being filled, as all customer changes are complete at this time. After addressographing, the new sheets will be checked against the old ones to insure that the correct forms and colors have been used. The cards in the addressograph frames and the tabs on the plates will also be checked for correct class of service at this operation.

After the meter books have been billed, all billing data in the advance punched cards (one card for each meter) will be run through a tabulating machine in the same folio order as the newly addressographed meter reading sheets. The data in the punched cards will then be tabulated line by line on master sheets, which sheets will be backed up by carbon paper so as to transmit the carbon impression on the back.

You have noted from the exhibit that

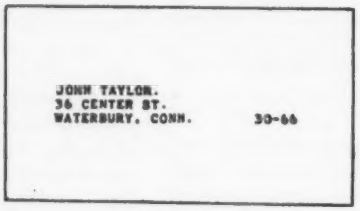


OLD METER READING SHEET



ADVANCE CARD

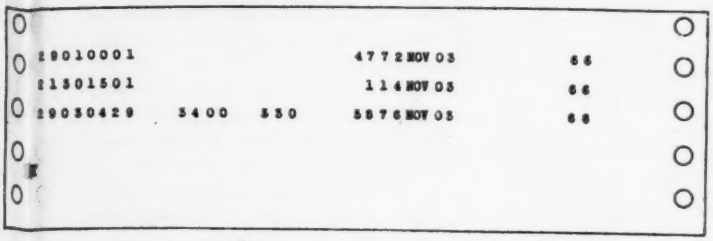
ELECTRIC ACCOUNTING



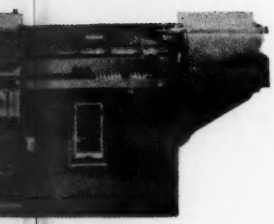
ADDRESSOGRAPH PLATE

OLD METER READING SHEET	ADDRESSOGRAPH PLATE	ADVANCE CARD	ELECTRIC ACCOUNTING MACHINE
To be rewritten	Meter reading sheets addressographed from plates.	Reproduced automatically each month as part of the billing operation. Cards and old meter reading sheets contain billing data to be transcribed.	Lists billing data from advance cards to master sheet

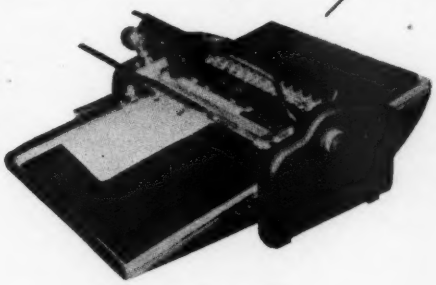
A NEW PLAN OF REWRITING METER READING SHEETS BY THE



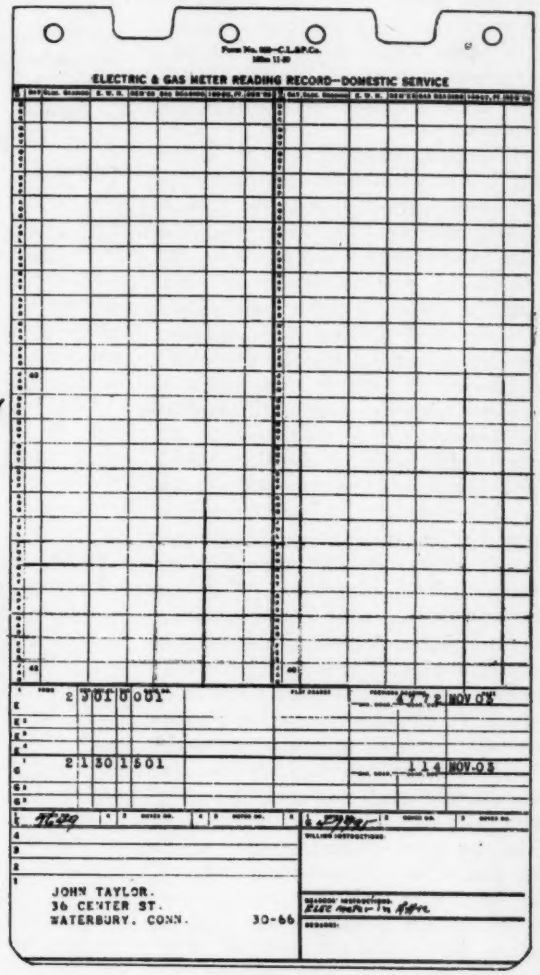
MASTER SHEET



ELECTRIC ACCOUNTING MACHINE



TRANSFER POSTING MACHINE



NEW METER READING SHEET

ACCOUNTING MACHINE	MASTER SHEET	TRANSFER-POSTING MACHINE	NEW METER READING SHEET
...ng data from advance ...r sheet	Impressions from tabulator listed on front of this form. Sheet is backed with carbon paper to transmit the carbon impression on back.	Impressions transferred from back of master sheet to front of new meter reading sheets.	Printed data transferred by machine. Written information transcribed manually.

...ETS BY THE CONNECTICUT LIGHT AND POWER COMPANY

the master sheets have perforated holes on the edges. An attachment called a pin-feed platen will be placed on the tabulator to insure positive feeding and alignment as the impressions are made. The master sheets should be made of a thin, porous paper to permit the absorption of a special fluid which is later explained.

The next operation will be to run the newly addressographed sheets and the master sheets through the transfer posting machine. The underlying principle of this machine is very simple. Just visualize a new meter reading sheet properly aligned in a flat position, and a master sheet with a carbon impression on the back also correctly aligned directly over it. With a depression of the motor bar the data on the back of the master sheet is transcribed to the new reading sheet on the line desired. This is a positive reproduction of data which is already correct. All errors in transcription, which might be expected if this work were done manually, are automatically eliminated.

Since this application of the transfer posting machine is new, it might be well to briefly describe the operation in more detail. The master sheet is inserted around the platen, positioned under the crosshead (a pressure bar), and the machine is then ready for transferring the data from the master sheet line by line. The new meter reading sheet, to which the data is to be transferred, is placed on the posting table underneath an indicator which designates the line on which the transcription will be made. As the motor bar is depressed, the new meter sheet is automatically carried forward underneath the crosshead, which has moved down, pressing the master sheet against it. While this is taking place, a special, quick-drying fluid is distributed by a ribbon along the bottom of the crosshead and this fluid is forced through the master sheet and to the meter reading sheet underneath. While both sheets are moist and under pressure, the carbon impression on the back of the master sheet is transferred to the meter sheet and the posting of the data is accomplished. The meter sheet is then automatically returned to the posting table for removal by the operator. Simultaneously, the master sheet advances to the next line to be transferred.

The speed of the transfer posting machine will vary with the type of records involved and as many as 1000 lines can be transferred in one hour. In our case, data will be transferred to the new meter reading sheets at the rate of 600 sheets per hour per machine.

Following the transfer posting operations, the meter numbers, constants, minimum guarantees, notations of special instructions and inactive sheets will be manually transcribed from the old to the new sheets and checked for accuracy. Upon completion, the new sheets will be placed in the meter book binders, the old ones in transfer binders and both books returned to the district offices.

It was our former practice to addressograph new route sheets and transcribe all other data manually. This new plan will reduce our former costs of rewriting by 50 per cent. It is estimated that the out-of-pocket expense to rewrite these sheets will be about $2,500. This figure includes the labor of eight temporary clerks, rental of the transfer posting machines, the cost of the new meter reading sheets and miscellaneous supplies. The cost of rewriting will be 1c. per meter on lines or 1.27c. per meter reading sheet.

The transcribing work will be accomplished with far greater speed and accuracy than heretofore, and may be done in a short period instead of running over many months. Changes in the design of forms can be adopted at one time rather than having to wait until the old sheets expire. Also, all readings will be uniformly recorded on the sheets, as all rewriting is done at the same time.

Meeting of the Joint Subcommittee on Development and Research

THE Joint Subcommittee on Development and Research met with its project committees on December 11 in New York, with Mr. Clark presiding. The various project committees presented progress reports covering the work for the last six months.

In addition to the progress reports three technical reports were presented.

Project Committee 2D—SPECIFIC DEVICES presented a Technical Report entitled "Gas Tube Voltage Recorders with Time Stamps." This report discusses a time recorder which is suitable for indicating the time of operation of the two-stage gas tube voltage recorder previously described to the Subcommittee. Also discussed is a 6-stage gas tube voltage recorder having a "built-in" time recording feature. Descriptions of the mechanical and electrical characteristics of each instrument are presented, together with general outlines of the operation of their circuits. Results of experience in the field with both devices are outlined, while detailed circuit descriptions are given in the two appendices.

Project Committee 2J—CONTROL OF RESIDUALS presented a Technical Report entitled "Inductive Coordination Aspects of Petersen Coil Grounding." This report discusses those features of a Petersen coil-equipped power system which are of importance from the inductive coordination standpoint. As a background for this discussion, a brief description of the theory of operation and extent of use of the Petersen coil is given, following which those features affecting inductive influence, such as residual current distribution, duration of faults, and percentage of faults likely to be cleared without breaker operation, are considered in more detail. Consideration is also given to means used for clearing permanent faults and to possible noise induction effects.

This project committee also presented a Technical Report entitled "Overvoltage Observations on a 44-Kv Neutral Resistance Grounded Power System." This report gives the results of overvoltage observations under operating conditions on a 44-kv power system consisting of approximately 550 circuit miles of line, and having its neutral grounded at one point through a 136-ohm neutral resistor. Data were obtained over a period of about 2½ years, a string oscillograph, cathode ray oscillograph, and surge recorder being utilized as measuring devices during the course of the observations. The results are given and discussed with special reference to the magnitude and nature of the overvoltage encountered on this type of system. These data supplement similar data from other systems which are given in Engineering Report No. 30 of the Joint Subcommittee.

The Technical Report on the Petersen coil was recommended for issuance as an Engineering Report and that on the overvoltage observations was recommended as a Provisional Report. Announcement will be made in the BULLETIN when these recommendations are acted upon by the Joint Committee on Plant Coordination.

Rewriting Meter Reading Sheets by Alphabetic Tabulating Cards

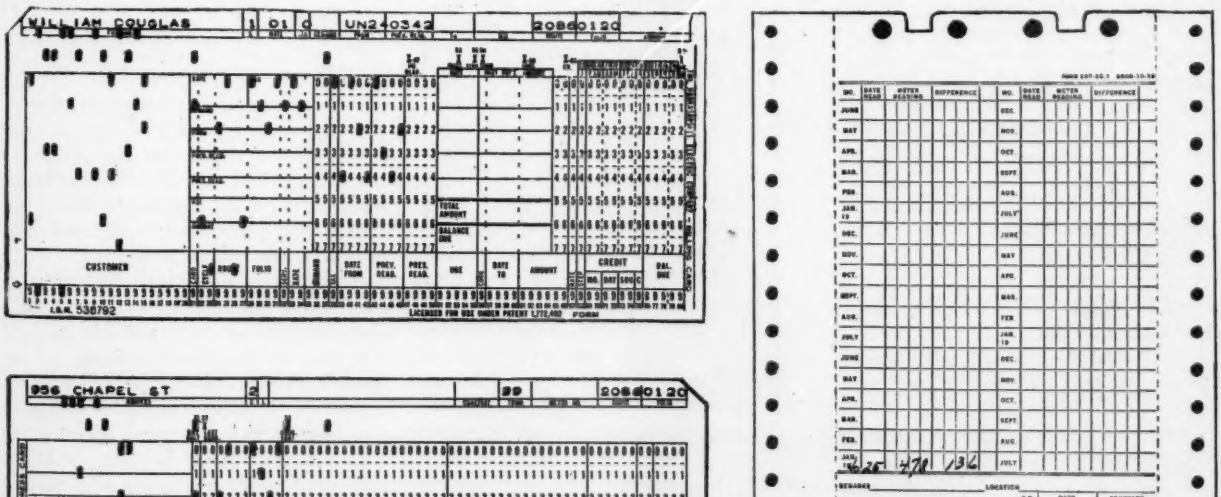
By J. O. Hill
The Narragansett Electric Company

An address before the Third National Accounting Conference, Edison Electric Institute, Chicago, Illinois, November 13, 14 and 15, 1939

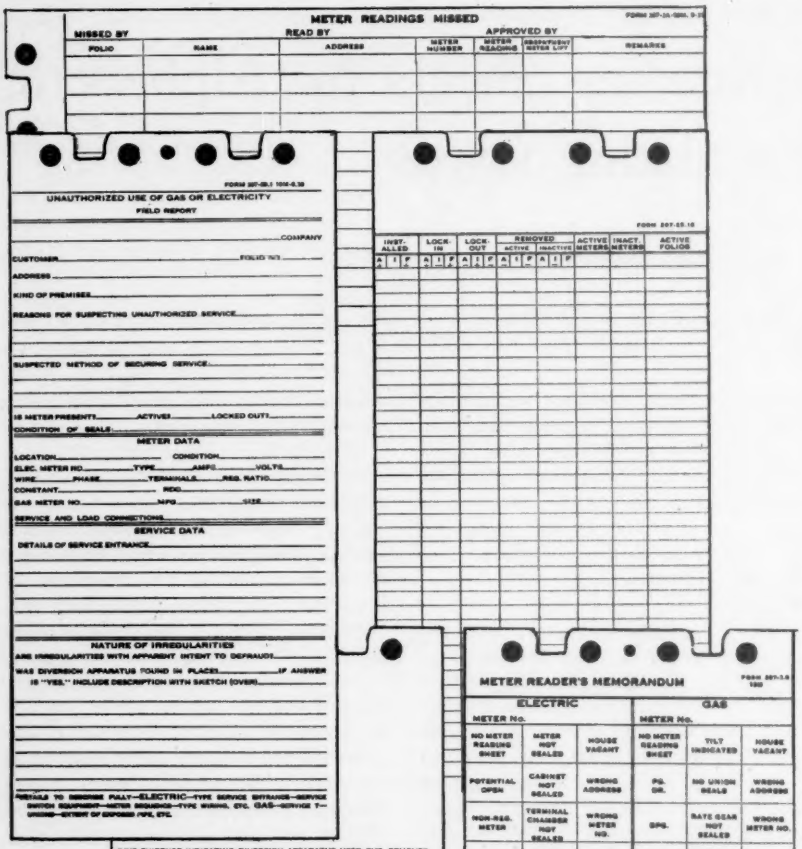
DURING the past few years we in the office accounting field have had a real job to keep up with the advancements in automatic office equipment. We have passed through the longhand, typewriter and addressing machine eras, which brings us to the automatic electric accounting or punch card age, where little holes punched into cards will, with a little help and intelligent application, do practically all the writing we need to record our millions of accounting entries. In the same period of development we have had equal advancements in methods of addition, subtraction, multiplication and division, and again those same little holes punched in cards will automatically do most of the accounting work formerly done by various types of machines, providing, of course, we have the machines to go along and help the cards. Since the advent of these little holes, rapid strides have been made in the design and application of the machines. In fact, new wrinkles are coming so fast that it is hard to keep informed as to the latest changes.

The Narragansett Electric Company, as have most utility companies, has gone or is going through the various steps of the electric accounting machine developments, and has tried to keep up with the fast pace set by the machine manufacturers. The latest step in our company was the installation of automatic alphabetic tabulating equipment for customers' accounting, employing cards with these little holes which are transcribed automatically month after month with no worry as to accuracy.

We had had the advantage of four years' study of alphabetical tabulating equipment as applied to general accounting and from that experience did not hesitate to apply the new idea to our customer accounting. This equipment is, I am told, the latest development for utility companies and was designed especially for the application which we are using. This equipment, by means of a card on which is automatically punched all previously collected information and to which the current meter reading is electrically added, will, when passed through the machine, record in bill form all data pertinent to the customer's electric and/or gas consumption, amounts, name and address, and at the same time



Completed cards and reading sheet



Meter reading sheets and memoranda

provide proof of billing, summaries of sales, etc.

When we installed the alphabetic punch card method in our customers' accounting department, we were faced with the problem of how we should rewrite our meter reading sheets—should we continue our old method, which, by the way, I believe is the method that about 95 per cent of the industry follows—or should we go all the way and make these little holes do double duty? The answer, of course, was to keep up with the (hole) mechanical parade and go all the way. But, how were we going to do it and what would it cost?

An analysis was made of the data which we carried on the meter sheet,

Codes for Meter and Address Cards

Card No.—Col. 21		*Rate Code—Col. 33-34*	
Name—1		A	1
Address—2 to 4		A Off Peak	3
2nd Meter—8		C	12
Arrears—9		C-O Prov.	45
Mdse.—9		C-O S. C.	63
Service Code—Col. 32		C-O Mystic	69
0		C2	13
1—Electric		D	14
2—Gas		D3-O	44
3—Merchandise		E	16
4—Jobbing		E-O Prov.	40
5—Prev. Address		E-O Tiv.	64
6—Interest Cr.		E-O S. C.	66
7—Deposit Cr.		E-O Mystic	67
8—Adjustment Dr.		F	23
9—Credit		G	24
Tax Code—Col. 38		G2	26
0—Taxable		H-O Prov.	46
Month Code—		H-O S. C.	68
Col. 39 & 40		H2-O	47
57 & 58		H3	27
Jan.	0 0	H4	28
Feb.	1 1	I	29
Mar.	2 2	R	48
Apr.	3 2	S Private	50
May	2 3	S Prov. Arc.	53
June	4 0	S Prov. Inc.	54
July	4 4	S2 Prov. Towns	56
Aug.	5 5	S3 S. C.	57
		S4 L. C. & T.	58
Sept.	6 6	Spec. W. Co.	60
Oct.	7 7	Meter Rental	77
Nov.	8 8	Affiliated Co.	78
Dec.	9 9	Sales to other Elec. Utilities	79
		Co. Use Elec.	80
		Co. Use Gas	83
		Memo Meters	84
		Special Contracts	65

and from this analysis we decided what factors we would be willing to eliminate from machine application and transcribe manually. This eliminating was made because we were determined not to increase any more than was absolutely necessary the cost of rewriting. Study proved that we could use the existing little holes in our billing and address cards to give us automatically, and at unbelievably low cost, practically all the essential items needed to rewrite the meter sheets. There were, of course, a few items which we found necessary to transcribe by hand, but we could by additional punching reduce the manual transcription.

Accuracy, speed and cost are the principal factors in any plan of rewriting. As to accuracy, we found that by using the alphabetic billing cards we would have a method which would be as near to perfection as could be expected. As to speed, we knew that our plan would far surpass any we had ever used. And

as to cost, we were confident of reduction over previous methods.

A brief summary of the common data that is necessary to transcribe to the new meter sheets is as follows:

*1. Customer's name.
*2. Service address.
*3. Meter number.
*4. Previous reading and date.
5. Meter constant.
*6. Billing rate.
*7. Route and folio.
*8. Mailing address.
9. Unusual meter location.
10. Special billing data.
11. Remarks re vicious dogs, etc.

* Data available for automatic transcription. In billing we use two types of cards: (see exhibit).

1. Billing Card—which contains the following punched data:

(1) Customer's name.
(2) Route.
(3) Folio.
(4) Type of service.
(5) Rate.
(6) Revenue class.
(7) Town.
(8) Date of previous reading.
(9) Previous reading.

2. Address Card—which contains:

(1) Service and/or Mailing address.
(2) Meter number.
(3) Route.
(4) Folio.

If the customer has a special mailing address, a third and, in rare cases, a fourth card is used.

By comparing the list of common requirements for meter sheets (see exhibit) with data in the advanced billing cards which have been automatically prepared for billing purposes, it will be noted that all items needed on the meter sheet are available except four, which are the least recurring. The first, or "Meter Constant," is needed in only a small minority of the sheets. In a great many companies and especially so in our company, meters with constants of over 1 are given special attention as to billings, etc. If desired, this information may be punched in the card and transcribed the same as the meter number and other data. The other three, "Unusual meter location," "Special billing data," and "Remarks," require manual transcription, but only on a small minority of the sheets.

At the present time under our machine method we are using a staggered plan of rewriting. This plan requires the rewriting of certain groups of routes each year and it is spread over a period of two months per group. The reading sheets provide for three years' readings. We have divided the rewriting in three groups, and are considering a continuous plan whereby we will rewrite certain routes each month, thus eliminating a peak during two months of the year.

THE PHOTOMURAL IN UTILITY OFFICES

The illustrations on the two following pages indicate the use being made by a number of utilities of the photomural, an art form having unusual possibilities for decorative and informative dramatization of company property and scenes.

Business offices, sales rooms and waiting rooms seem to offer ideal opportunity for display of the utility's choicer camera shots to visiting customers.

Developed within the past decade, the photomural, as the name suggests, is a mural or wall decoration, obtained by photographic process. The original negative is projected upon large sheets of sensitized paper, which are then mounted directly on the wall surface or on large panels.

Preparation

Little preparation is necessary in the rewriting which is done in three major steps:

Step 1—Sorting—by mechanical means requiring two operations:

(1) Grouping the name and address cards in folio sequence.

(2) Sorting the second meter and inactive service cards into separate groups.

This sorting is very fast and requires little attention from the machine operator.

Step 2—Imprinting by means of an automatic alphabetic machine all necessary data as far as meter reading is concerned.

Step 3—Manual transcription of special data such as "Meter Constant," "Unusual Meter Location," "Special Billing Data" and "Remarks."

Procedure

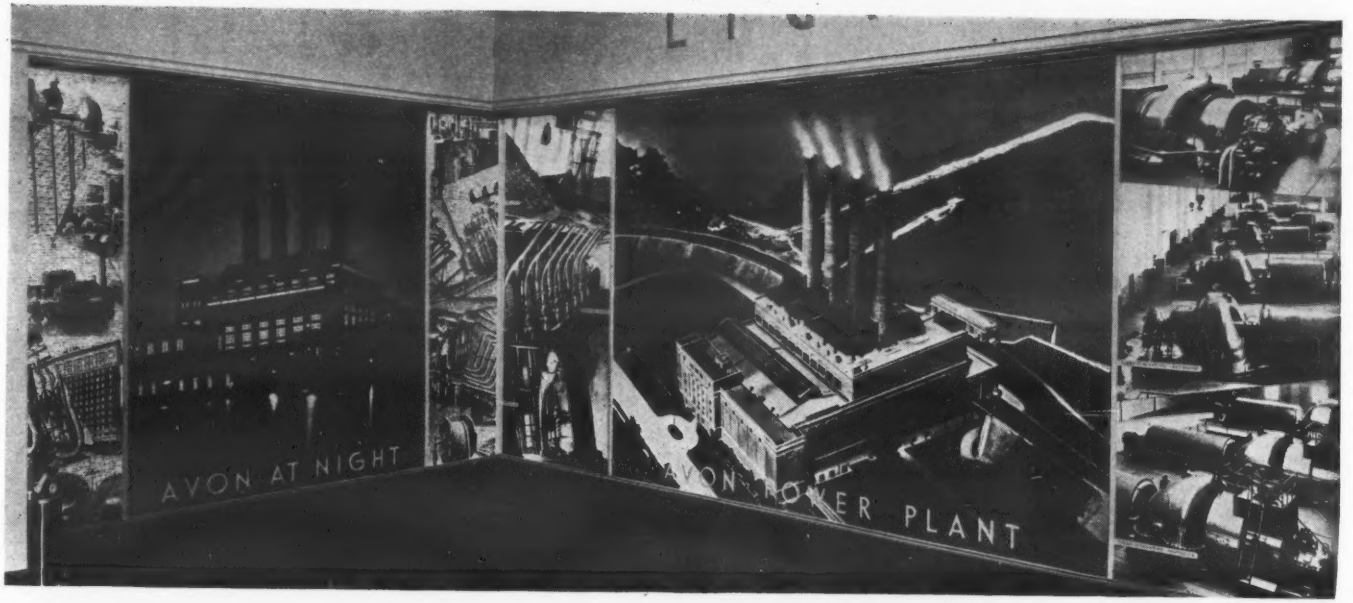
After mechanically sorting the cards in folio and printing sequence, they are placed in the automatic tabulating machine. This machine transcribes from the punched holes in the cards to the meter reading sheets (which are printed on a continuous form) by means of an automatic carriage designed to provide absolute registration of each printing line as well as the spacing up of each sheet to correct printing position regardless of the number of printed lines. At the time the necessary data is being transcribed from the cards to the meter reading sheet, the machine automatically tabulates the totals of the folio numbers and total number of meters in separate registers. These tabulations are used in proving that all active meter reading sheets have been rewritten. This proof is obtained by balancing the tabulated totals in the machine to the route control sheet in the front of the meter book. The route control furnishes the totals of all folio numbers in the route and the total number of active meters; the principal use of the control sheet is for billing, but also furnishes proof of our rewriting. The meter reading sheets are then given to the meter reading control clerk who transcribes manually the special data which is not in the punch cards.

Speed and accuracy are the two principal factors which are necessary and from our experience this machine method is by far the best. As to accuracy, since all but a few minor items are taken from the billing cards, it must of necessity be correct. As to speed, the automatic accounting machine which we use operates at a speed of 80 printing lines a minute. Experience indicates that we can print between 750 and 1000 meter reading sheets per hour, which includes preparation and proving, the number varying according to the number of printed lines.

What of the Future?

There is a crying need to further develop the alphabetic tabulating card as applied to meter reading. I trust I am not divulging any secrets when I say that we are looking forward to the day when we will be the first to eliminate the use of the so-called meter reading sheet. In fact, with what has been accomplished by automatic machines in the past ten years and what we expect to see in the next few years, there is no doubt in our minds but that with a few machine changes we will be able to do away with the old style meter reading sheet entirely, and use the advanced billing card to record the current month's meter readings. This, as you can readily understand, would eliminate once and for all the nuisance of rewriting meter reading sheets.

Photomurals in the office of Britton I. Budd, president, Public Service Company of Northern Illinois.



Cleveland Electric Illuminating Company's Avon plant makes a dramatic display.

Photomurals used as a frieze over counter in Peoples Power Company Office.

Photomural montage in Consolidated Edison Company's 87th Street Office.

Customer Accounting Problems in Connection With Statistics for Federal Power Commission Reports

By E. N. Keller
Philadelphia Electric Company

An address before the Third National Accounting Conference, Edison Electric Institute, Chicago, Illinois, November 13, 1939

THERE devolves upon Customer Accounting Sections of various utilities the work of compiling statistics for insertion in some of the Schedules contained in the Annual Report to the Federal Power Commission. A number of these schedules require accumulation of data either monthly or annually, but the information is without any useful or specific purpose in so far as the utility is concerned. In many instances, non-conformity or direct conflict exists with the Classification of Accounts. Not only will the furnishing of these data cause considerable unnecessary labor and expense, but also in some instances a complete revamping of billing systems with possible scrapping of office equipment and the consequent installation of high priced machinery creating an expense out of proportion to the needs of the utility for normal operating purposes. Many companies, and particularly the hundreds of smaller ones, cannot afford either the capital investment necessary to make such changes or the current operating expense. The result is going to be either complete ignoring of the request or the submission of figures built up purely from guess. In either case, the result will be unsatisfactory.

In order to afford opportunity to follow the remarks I am going to make on certain of the Schedules, copies of them are attached, as well as the definitions and instructions pertaining to the Rate and Sales Section of the report.*

For the few who may be able, at reasonable cost, to devise mechanics to gather certain of the information, the matter of definition is of concern. Some of the definitions and instructions are not only impractical but impossible of fulfillment with any worthwhile degree of accuracy. Specifically, those causing the most general debate are:

1. Determination of "community" boundaries.
   A. For compilation of data for Schedule 527—Sales by Communities.
   B. Segregation of so-called "rural areas"—Schedule 600.
2. Application of the definition of a "farm" —Schedule 600.
3. Assignment of total sales to class having principal use—Schedule 600.
4. Division between commercial and industrial use—Schedule 600.

Taking these up in the order listed, the following comments seem pertinent. There are in suburban areas of the larger cities or towns, served by many utilities, built up portions which are practically continuous, but the names of the localities may differ according to the section in which the customer resides. In some instances, these unincorporated but many times congested sections completely surround another comparatively small incorporated area. It is practically impossible for anyone, even those quite intimately familiar with the territory of any particular utility, to accurately determine the imaginary boundary line of such so called "communities." Even if a boundary so selected were used as the basis of one year's compilation of figures by reason of rapid development there is no reason to assume that this same imaginary boundary would be correct for the next or succeeding years.

While it may not seem difficult to make somewhat arbitrary boundary for a community in more outlying district, yet such trouble does exist, for ofttimes from a crossroads settlement dwellings may be strung out for two, three or four miles practically merging with some other crossroads settlement. It is impossible to determine the line of demarcation necessary to attempt to arrive at the population of such unincorporated centers. Nor even if such boundaries could be selected are there any population figures available, in order to determine whether they are below or above 2,500 as called for in Schedule 527, or 250 as required in the definition of a "rural area."

It follows, therefore, that there can be no possible consistent application of a definition for this term; the result being that any figures furnished by various utilities are, of necessity, valueless for comparative purposes. Therefore, the definition, if any figures are furnished at all, will be on some basis peculiarly adaptable to the particular utility and causing the least difficulty in assembling rather than any comparable application of the rule.

By reason of the foregoing, it is plainly apparent that the data as called for under Schedule 527 "Sales by Communities of Over 2,500 population" and in Schedule 600 "Rural Service" cannot be obtained.

Another term which has been bandied around for some years by regulatory authorities and which finds its way into the data to be furnished under the heading of "Rural Service" is the definition of a "farm." It is difficult to conceive how utility employees are to know whether the customer has three or more acres of land and, what is worse, if he has less than three acres, whether he devotes his entire time to agriculture. The only way that this can be determined is for the customer to tell us. Naturally, he will not do so voluntarily and in many cases will not subject himself to the interrogation necessary on the part of the utility employee to obtain the information. Assuming that such records could be obtained for each customer, it does not follow that the findings then made would remain constant —which indicates that continual re-survey would be necessary to keep the record up to date.

*Due to space limitations these schedules are not reproduced herein. Copies may be obtained from E.E.I. General Office, 420 Lexington Ave., New York, N. Y.

It follows, therefore, that if any information is supplied in answer to this question it must of necessity be only the figures which find their way into the classification "rural sales" as defined by the Uniform Classification of Accounts of the Federal Power Commission, which has the advantage of being clearly defined, and of practical application.

In the second paragraph of definitions under the Rate and Sales Section it is nonchalantly stated that "when energy measured through a single meter is used for more than one class of service as here defined * * * assign the total to the class having the principal use" as though it were something to be done merely by the waving of a wand. In practice, however, this is not at all simple. There are thousands of customers in any moderate sized utility who use service for dual purposes; for instance, barber shop connected with the residence, doctor's office and residence, beauty shop and residence, drug store and residence, stores and bakeries, etc. Generally speaking, service is supplied through one meter to one premises where the contracted party assumes liability for all of the service. Therefore, there is no possible way of segregating the use for the residential portion on the one hand and commercial on the other; or, as the case may be, the commercial on the one hand and the industrial on the other. By the same token, there is no consistent method by which it can be determined which of the combined uses is the principal one. It follows, therefore, that utilities must of necessity find some other way for the segregation of sales and revenue in these border line cases. Generally speaking, it is done better on a rate schedule basis. Most companies' tariffs provide schedules for commercial use and others for industrial use as distinct from residential. Likewise, most of them either have a provision that where a dual use is involved, the customer enjoys the rate which is the most beneficial or, in some cases the rates are so constructed that, for example, any commercial use requires that the commercial service rate be applied. If anyone can give any better method of determining the classes of services in these types of cases, I am sure that the industry would appreciate the information.

It is noted with some satisfaction that the line of demarcation between commercial and industrial services, while indicated as being 50 kilowatts of demand or 180,000 kwhr. per year, still gives some leeway in stating that "where neither basis can be strictly followed, the division is to follow one or the other as close as existing rate schedules will permit." This seems to be rather ambiguous and contradictory. It would seem that either you can or cannot follow it regardless of rate structures, but actually the division indicated is inequitable for the reason that the use of a 1 hp motor to drive a small lathe or saw or other piece of equipment is power just as much as is a 100 hp motor. It is actually only a matter of size or degree. Another factor in connection with this is that any such arbitrary mathematical division would of necessity have to be revised at least once a year, due to either the changing demand or kilowatt hour consumption. I submit to you that from a billing and accounting standpoint, the segregation between industrial and commercial services on this basis is neither practical nor of any value. Likewise, it must be pointed out that the Classification of Accounts does not call for any segregation of these two classes of sales.

In addition to the matter of definitions and their application, there is also in order certain comment relative to some of the Schedules on which the meaning is entirely clear but the practicability is rather dubious. I refer to:

1. Schedule 600 where under heading JK information is called for purporting to be sales to municipalities or governmental units. I direct attention to the fact that the Classification of Accounts does not call for any such segregation except under the heading of public street and highway lighting and other sales to public utilities; such use being only under special contracts or agreements on service classifications applicable only to public utilities. Since sales to such units may also be made under commercial and industrial rates, it would be necessary, therefore, under the terms of the requirement in Schedule 600, to analyze such revenue twice—for the purpose of complying with the classification and for the Schedule mentioned. To do so would be burdensome and costly and, from a utility viewpoint, unnecessary.

2. In Schedules 602 and 603, data are required which can only be supplied from a bill analysis. While it is indicated that only one month's work need be analyzed for this purpose, yet apparently the Commission fails to realize the amount of labor necessary to do so. Many companies without the benefit of the type of mechanical equipment particularly adapted to this kind of work are of necessity going to be put to considerable unnecessary expense in order to supply the figures. To make matters worse, under Schedule 603 again the division between commercial light and commercial power is apparently required, but for the reasons before mentioned, it cannot possibly be supplied.

Many commercial rates are based on demands or room areas—which makes it impossible to conceive how any bill analysis by consumption steps could possibly be of any use. That being the case, what purpose can this particular Schedule supply?

While in my references to Schedule numbers, I have been referring to Form No. 1 which applies to Classes A and B companies, the same relative difficulties apply to Forms Nos. 96 and 97 for Classes C and D utilities. Furnishing the information specifically mentioned in this discussion is a distinct burden to all utilities and while a few of the larger companies may be able to devise mechanical means to obtain the data with only modified increase in cost, the hundreds of smaller utilities with limited resources and means will find the requirement especially burdensome.

There is no desire to suggest any revision or enlargement of the Classification of Accounts to embody the necessary factors to bring it in line with the Annual Report, yet the utility accountant cannot understand the reason for deviation from the prescribed authority, viz, the Classification of Accounts issued by the Federal Power Commission. They cannot understand either the lack of appreciation of the difficulties and attendant expense in the issuance of such requirements, particularly with vague and meaningless definitions.

It is evident, however, from an analysis of the methods which of necessity must be followed by utilities throughout the country in preparing revenue statistics, that even such apparently commonplace classifications as "residential" or "commercial" are for comparative purposes almost without value since the rate schedule characteristics in the various utilities are by no means consistent. It follows, therefore, that it might be better to suggest the reporting of revenue simply on a rate schedule basis.

What most utility companies are going to do about gathering these data seems to be indeterminate at this time, but undoubtedly much of the information furnished will be derived from so much guess work that the figures will be of little or no use after they are received, and in some cases companies are going to have to flatly refuse to furnish information because of inability to compile it on account of the cost, as well as indefinite interpretations.

It is pertinent to suggest in closing that this Committee take steps to assemble the thoughts of the industry, with a view to discussion with the proper officials of the Federal Power Commission, in an endeavor to obtain a modification of the requirements as covered in certain of the Schedules referred to.

Balance Sheet Accounts and the Public Interest

By M. J. Miley
Consolidated Edison Co. of New York, Inc., New York, N. Y.

An address before the Third National Accounting Conference, Edison Electric Institute, Chicago, Illinois, November 13-15, 1939

THE interest in balance sheet accounts of public utility companies, heretofore limited principally to the utility management, regulatory bodies, financial institutions and insurance companies, has in recent years shown a tendency to include the small investor and the general public. This tendency may be attributed in part to the misfortune which in 1929 engulfed innumerable small investors who had previously invested their funds blindly, in unstable industrial or other stocks.

This type of so-called investing, prior to the start of the depression, was done by individuals who in many cases had no knowledge of the organizations or even the business behind the securities which they bought. Similarly, their curiosity never ventured into the published statements or annual reports of these companies, and it is doubtful whether any perceptible number of stockholders would have had the ability to interpret such reports had they troubled to examine them.

Repercussions of the 1929 financial calamity became manifest in the legislation resulting in the Securities and Exchange Commission and laws pertaining to transactions in securities. Certain sections of the laws had the twofold effect of prescribing corporation reports as to method, and integrity of published data; and of making the small investor conscious of the necessity of informing himself as to the financial stability of the corporations in which he sought to invest.

Consequently, the security-buying public since 1929 has exhibited an increasing interest, not only in reviewing the published data pertaining to corporation issues, but in seeking more information in regard to corporation balance sheets and the details underlying each asset or liability account.

Banking houses or investment trusts have available a sufficient number of highly trained accountants, engineers and analysts, to investigate into the affairs of corporations in which clients are advised to make investments; this, however, is not true for the individual or small investor who must be his own advisor and whose only source of information is in the interpretation of published balance sheets and reports.

It is quite probable that public interest, having been thus aroused, will continue to concern itself with the development of new and more enlightening methods of balance-sheet and income-account presentation in published annual reports.

Old and New Methods of Balance Sheet Presentation

Considerable change in the form of balance sheet presentation is already in evidence in many of the larger public utility companies, banks, insurance and trust companies, and industrials. Most of the change is in the form of added explanation immediately following the conventional accounting terminology of either asset or liability item, rather than in the form of footnotes, or notes contained in some other part of the report. Even such self-explanatory items as cash, or accounts receivable, are frequently supplemented with qualifying descriptive annotations.

This is a far cry from many of the less modern balance sheets which bore accounting titles which meant little or nothing to the uninformed. Among such veiled and uninformative titles we find assets entitled: Deferred Debits, Concessions, Advances, Good Will, Patents, Trade Mark, Securities, Equipment and Supplies, Claims, Suspense, Investments, Inventory and Leasehold. Among the liabilities we find items entitled: Deferred Credits, Accruals, Reserves and Current Accounts.

The investing public of today is not satisfied with such unadorned items appearing in the balance sheet of an organization in which it contemplates making an investment. Publishing such meager detail in its annual reports has a tendency to make an investor more wary of the security of his investment notwithstanding the fact that a certificate of audit may accompany the report.

An outstanding example of the more modern type of balance sheet presentation is found in the 1938 published annual report of a large eastern utility company (See exhibit "A"). This type of balance sheet, as far as form and presentation are concerned, indicates the trend of the new requirements demanded by the small investor and the interested public.

Regulatory Commission Requirements re Balance Sheets

Very definite classifications of assets and liability accounts have been set forth in the Federal Power Commission's Uniform System of Accounts prescribed for Public Utilities and Licenses, effective January 1, 1937. In addition, the State Commissions, which perform regulatory duties in connection with Public Utility Companies, have prescribed classifications almost identical with the Federal Power Commission's System of Accounts.

Notwithstanding these attempts at uniformity, there are still companies which continue to adhere to outmoded historical nomenclature in their published annual reports. Moreover, the treatment or non-treatment of optional accounts may throw an entirely different light on the balance sheet of one company as compared with that of another company whose acceptance of the options differ. A reserve account treated on one hand as a direct deduction from the corresponding asset account and on the other hand as a discernible liability account, creates an outstanding dissimilarity. In some instances, the wishes of public accounting firms play an important part in the accounting treatment, and again, in other instances, the management of the utility stands on its own prerogatives in setting forth its published data in such manner as it sees fit.

It is interesting to note that balance sheet figures appearing in data submitted by companies to the Securities and Exchange Commission, frequently differ in presentation from the same companies' figures in both annual reports to stockholders and reported figures to the State Regulatory Body.

It may be logically expected that public interest will demand a more uniform treatment of items throughout the industry, somewhat along the lines of prescribed accounts of the Regulatory Commissions. This is particularly true of companies whose securities are held by a great number of stockholders.

In conclusion, let us not lose sight of the fact that the investing public, large and small, are entitled to know of the financial status of your Company. It therefore becomes the responsibility of the industry to portray in language common to the layman, the facts as stated on the balance sheet, not only in figures but with sufficient descriptive understandable text.

Exhibit "A"

A UTILITY COMPANY

CONSOLIDATED BALANCE SHEET—DECEMBER 31, 1938

ASSETS

UTILITY PLANT		$xxx,xxx.xx
(Represents the book value of land, buildings, equipment and other facilities used in utility operations. Many uniform system of accounts prescribed by regulatory bodies provide that utility plant shall be recorded at "original cost" (defined as "the cost of such property to the person first devoting it to public service") and other segregation and reclassification of their Utility Plant. Every effort is being made through analyses necessary to comply with these provisions).		
CURRENT AND ACCRUED ASSETS:		
CASH AND WORKING FUNDS (Cash on deposit and on hand to be used in the purchase of materials and supplies, and payment of wages and miscellaneous obligations).	$xxx,xxx.xx	
SPECIAL DEPOSITS (Moneys deposited with paying agents and trustees principally to pay interest on bonds and dividends).	xxx,xxx.xx	
TEMPORARY CASH INVESTMENTS (Current funds temporarily invested in securities which are carried at cost; market value $xxx,xxx.).	xxx,xxx.xx	
ACCOUNTS, RENTS AND NOTES RECEIVABLE (Money due and currently outstanding from customers for electric, gas and steam heating service, merchandise installment sales, rents, and other items. Reserves have been provided for losses which may be incurred in the collection of customers' accounts).	xxx,xxx.xx	
INTEREST AND DIVIDENDS RECEIVABLE (Interest and dividends due the Company payable subsequent to Dec. 31, 1938).	xxx,xxx.xx	
MATERIALS AND SUPPLIES (Coal, oil, wire, cable, pipe, poles, merchandise for resale and numerous miscellaneous items).	xxx,xxx.xx	
PREPAYMENTS (Insurance premiums, miscellaneous rentals and other expenses paid in advance).	xxx,xxx.xx	
OTHER CURRENT AND ACCRUED ASSETS (Descriptive text where applicable).	xxx,xxx.xx	
TOTAL CURRENT AND ACCRUED ASSETS		$xxx,xxx.xx
CARRIED FORWARD		$xxx,xxx.xx

LIABILITIES

CAPITAL LIABILITIES:		
CAPITAL STOCK (Defined as between Preferred, Common, Par or No Par).		$xxx,xxx.xx
PREMIUM ON CAPITAL STOCK (Premium realized from the sale of Stock at prices in excess of its par value).		xxx,xxx.xx
LONG TERM DEBT (An issue of $xxx,xxx matures Oct. 1, 1939).		xxx,xxx.xx
TOTAL CAPITAL LIABILITIES		$xxx,xxx.xx
CURRENT AND ACCRUED LIABILITIES:		
ACCOUNTS PAYABLE (Amounts payable for the purchase of materials and supplies and for other current indebtedness).	xxx,xxx.xx	
DIVIDENDS DECLARED (Dividends payable to stockholders at some future date).	xxx,xxx.xx	
MATURED INTEREST (Represents matured interest due and payable to bondholders. Funds have been deposited with paying agents).	xxx,xxx.xx	
CUSTOMERS' DEPOSITS (Amounts deposited with the utility by customers as security for the payment of bills).	xxx,xxx.xx	
TAXES ACCRUED (Taxes payable subsequent to Dec. 31, 1938).	xxx,xxx.xx	
INTEREST ACCRUED (Interest payable on long term debt and customers' deposits subsequent to Dec. 31, 1938).	xxx,xxx.xx	
OTHER CURRENT AND ACCRUED LIABILITIES (Descriptive text where applicable).	xxx,xxx.xx	
TOTAL CURRENT AND ACCRUED LIABILITIES		$xxx,xxx.xx
DEFERRED CREDITS:		
CUSTOMERS' ADVANCES FOR CONSTRUCTION (Amounts paid by customers for main and service extensions, subject to refund under certain definite conditions).	xxx,xxx.xx	
OTHER DEFERRED CREDITS (Miscellaneous pending items which will be disposed of as transactions are completed).	xxx,xxx.xx	
TOTAL DEFERRED CREDITS		$xxx,xxx.xx
CARRIED FORWARD		$xxx,xxx.xx

ASSETS BROUGHT FORWARD		$xxx,xxx.xx
INVESTMENT AND FUND ACCOUNTS:		
OTHER PHYSICAL PROPERTY (The book value of land, buildings for other than utility service held for sale or other disposition).	$xxx,xxx.xx	
OTHER INVESTMENTS (Securities and investments carried at cost, which is $xxx,xxx more or less than market value).	xxx,xxx.xx	
SINKING FUNDS (Amounts paid to trustees, as required by the provisions of bond mortgages).	xxx,xxx.xx	
TOTAL INVESTMENT AND FUND ACCOUNTS		$xxx,xxx.xx
DEFERRED DEBITS:		
SUNDRY DEFERRED ITEMS (Miscellaneous pending items which will be disposed of as transactions are completed).		$xxx,xxx.xx
TOTAL		$xxx,xxx.xx

LIABILITIES BROUGHT FORWARD		$xxx,xxx.xx
RESERVES:		
RESERVE FOR DEPRECIATION OF UTILITY PLANT (Provision for the retirement of existent property at some future date by reason of obsolescence, inadequacy or other cause).	$xxx,xxx.xx	
RESERVE FOR DEPRECIATION AND AMORTIZATION OF OTHER PROPERTY (Provision for the retirement of existent property not used in utility operations).	xxx,xxx.xx	
RESERVE FOR UNCOLLECTIBLE ACCOUNTS (A reserve against which may be charged losses incurred in the collection of accounts due from customers).	xxx,xxx.xx	
MISCELLANEOUS RESERVES (Reserves set aside for losses from injuries to persons and damage to property of others, for contingencies and other reserves).	xxx,xxx.xx	
TOTAL RESERVES		$xxx,xxx.xx
CONTRIBUTIONS IN AID OF CONSTRUCTION (Amounts paid by customers, not subject to refund, for main and service extensions beyond the free allowance).		$xxx,xxx.xx
CAPITAL SURPLUS (Represents surplus arising from the acquisition of the utility's capital stock, from donations by stockholders of the utility's capital stock, from a reduction of the par value of the utility's capital stock).		xxx,xxx.xx
EARNED SURPLUS (Represents balance of unappropriated surplus arising from earnings).		xxx,xxx.xx
TOTAL		$xxx,xxx.xx

Effect of Competitive Fuels on Use of Electricity in Ontario

THE influence of competitive fuels upon the use of electricity for residential (domestic) service is illustrated by statistics from the latest annual report of the Hydro Electric Power Commission of Ontario. The adjoining table compares three places in Ontario where natural gas has been in general use with three similar localities where electricity has been free of this competition for cooking and water heating. Although the rate structure is substantially the same, the use of domestic electric service in towns with natural gas is 45 per cent below similar towns without gas and about 43 per cent below the average for all places in Ontario.

In the case of Riverside, natural gas service really began in 1928 with about 30 customers and grew to 1030 in 1938. During the same period, electric use declined from 199 kwhr per month per customer to 112.

KWHR USED PER MONTH PER DOMESTIC CUSTOMER

	Towns with Natural Gas Service			Towns Without Natural Gas		
	Port Colborne	Riverside	Welland	Brampton	Mimico	Waterloo
Population ..	6,348	5,090	10,924	5,638	6,940	8,425
Year						
1926	98	141	114	102	144	146
1928	99	199	105	124	156	155
1930	100	158	112	138	168	167
1932	72	153	102	151	162	166
1934	86	135	107	154	178	181
1936	87	117	106	165	176	198
1938	91	112	113	163	182	230
Average Cost, Cents per kwhr, 1938	1.9c.	2.2c.	1.6c.	1.4c.	1.3c.	1.1c.

Trouble Dispatching by Radio

By Howard L. Davis, Jr.
Philadelphia Electric Company

Presented at the Joint Meeting of the Electrical Equipment Committee and the Transmission and Distribution Committee, E.E.I., Swampscott, Mass., Oct. 10

THE ultra-short wave radio system, WQLP, of the Philadelphia Electric Company was placed in service in January, 1939. The service was established for the Service Maintenance Division in the City of Philadelphia. This Division is charged with the responsibility of following up customer complaints, restoring service, locating faults and the maintenance of the street lighting system in the City. It does no routine maintenance or construction work on the transmission and distribution circuits. The radio provides an additional channel of communication which enables this Division to assemble ample men and materials to cope with any emergency more quickly.

The system consists of a headquarters transmitter, a headquarters monitoring receiver, three remote receivers feeding into telephone lines to the dispatcher's office and 13 radio equipped cars and trucks, two of which have mobile transmitters. Most of the cars are light trucks and ladder wagons, one of which is shown in Fig. 4. The general system arrangement is as shown in Fig. 5. It is 1.3 miles from the dispatcher's office to the main transmitter and 1.8, 4.4 and 8.5 miles, respectively, to each of the pickup receiver stations.

The radio system serves an area of 129 square miles with a maximum line of sight transmitting distance of 15.5 miles.

Headquarters is in the Trouble Dispatcher's office. At each dispatcher's position is a telephone jack where a regular telephone headset can be plugged in to control the radio. Connecting the headset puts the main transmitter on the air by cutting in the plate voltage, the filaments being energized at all times. The output from the pickup receivers is also fed to the dispatcher's headset by this operation. With this arrangement the dispatchers handle radio messages in exactly the same manner and with the same ease as normal telephone traffic.

The headquarters transmitter is housed in a screened-in room on the top floor of a company-owned 22-story office building in the downtown section of the City. It is connected through a concentric transmission line to a half wave J-type vertical antenna on the roof directly above the transmitter. This antenna is mounted on a steel pole, as shown in Fig. 1, to give a maximum height of 70 feet above the 325-foot building. The antenna pole rests on the steel girders supporting the roof.

The transmitter, a complete unit, was originally a 50-watt General Electric Co. Type 4G6A1, operating on a frequency of 39660 kilocycles. Two sources of power are provided from circuits in the building. A 250-watt General Electric Co. Type 4A12A1 has been installed to replace the 50-watt unit. Additional power was installed because of exceptionally high noise levels along some of the heavier city traffic arteries.

There are two mobile units equipped with transmitters. These are 15-watt General Electric Co. Type 4G1B1, operating on a frequency of 33820 kilocycles. One is installed in a light service truck operated by the shift supervisor and the other is in a coupe operated by the supervisory call-man. The other 11 cars are equipped with receivers only.

On the mobile units, separate antennae are used for transmitting and receiving. The transmitter whip type antenna is mounted on the rear bumper. The receiving antenna is erected on the back of the cab.

Most of the transmitters and receivers in the mobile units are carried in a compartment on the floor immediately behind the cab. Vibration in this location is very severe. While this has not introduced any major problems, it is felt that mounting the sets in the cabs may offer some improvement.

The receiving equipment consists of 13 mobile receivers and four headquarters receivers. There are 12 G. E. Co. Type MI-7802 battery operated mobile receivers with dynamotor power supply

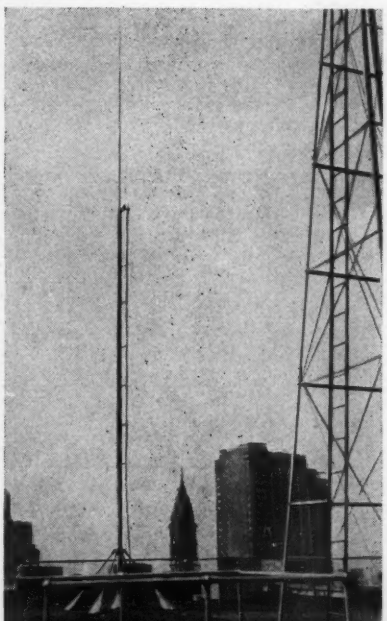


Fig. 1—Headquarters transmitter antenna

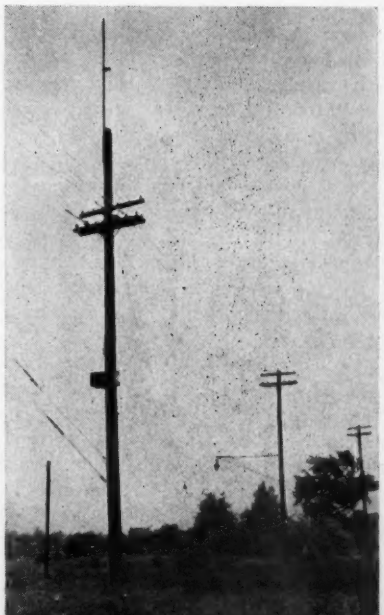


Fig. 2—Remote receiver location

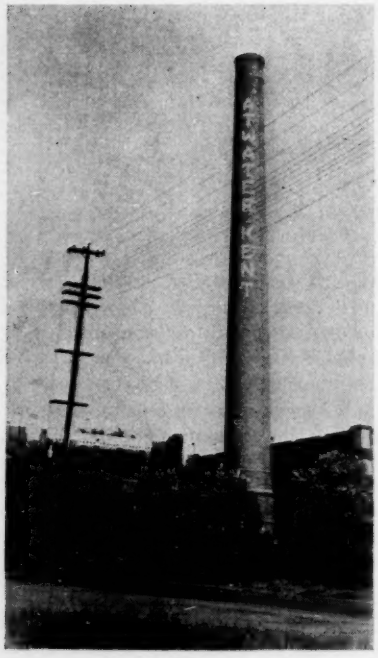


Fig. 3—Remote receiver location

and one F. M. Link, Type 8-UA mobile receiver with vibrator power supply. The headquarters receivers are all G. E. Co. Type MI-7803, with A-C power packs. Three of these are used at pickup points and the fourth is used for monitoring the main transmitter.

The pickup points are somewhat unique in their locations. One is installed at a generating station with a half-wave vertical "J" antenna mounted at the top of a huge electric sign on the roof. The second is located on the highway with the receiver and a half-wave certical doublet antenna mounted on a standard distribution line wood pole (Fig. 2). The third pickup point is located near an industrial plant using a half-wave vertical doublet antenna suspended at the top of a high smokestack (Fig. 3).

In seven months of operation 1603 calls have been placed. Approximately 84 per cent of these were completed satisfactorily. This is a very good percentage when allowance is made for the instances where men could not possibly be reached because their work necessitated temporary absence from their cars.

Poles and wires down and circuit outages constitute the largest group of trouble cases for which the radio is used. From Table I it will be noted, however, that two-way conversations with mobile units regarding restoration of service and clearing hazards constitutes the largest class of actual calls. This is due to the fact that radio has proved of inestimable value as a means of communication for facilitating switching and fault locating, particularly where men in the field have to be contacted. Much time is saved in restoring service in such instances.

In one case a water main broke at a municipal pumping station with a loss of both power and telephone service. The radio was used for a period of about 3½ hours in connection with tests to locate the power fault and restore service.

In another instance service to a large milk processing plant was maintained through a complicated switching problem quickly executed by the use of the two-way radio. With regular telephone service which is not readily available at the customer's substation, a much longer time would have been required for the operation.

The problem of underground cable fault locating has been speeded up by the use of radio, since field men can maintain closer contact with the station personnel.

Even with one-way communication (cars equipped with receivers only) much time is saved in line sectionalizing and clearing trouble. To cite one case, an automobile struck a pole, a one-way car was dispatched and within nine minutes after the call was placed the field man gave complete details and cleared the fault. In another instance a 13 kv line was reported out of service. A one-way car was dispatched to open a line switch in an effort to sectionalize. A few minutes later other information came indicating the possible source of the trouble. A second radio call was placed to cancel previous orders and proceed to another location, open the switch and report back. The trouble was definitely located and isolated with

Fig. 4—Radio equipped ladder wagon

TABLE I—EMERGENCY CALLS—W Q L P
7 Months Ending August, 1939

Subject of Message	Number of Calls Satisfactory	Unsatisfactory	
Poles and wires down, line and circuit outages	489	125	
Two-way conversations with mobile units regarding restoration of service and clearing hazards	705	106	
Fire Alarms	84	15	
Street Lights	67	12	
TOTAL	1,345	258	1,603

TABLE II—RADIO EQUIPMENT FAILURES—W Q L P
7 Months Ending August, 1939

Unit	Total Repair Jobs	Nature of Repairs: Battery Replaced	Generator Repaired or Replaced	Retune Receiver	Defective Tubes	Repair Antenna	Misc. Repairs
Two-way Mobile Units	41	18	5	5	3	3	7
One-way Cars	137	41	9	31	18	6	32
Headquarters and Pickup Receivers	19	..	..	5	7	..	7
TOTAL	197	59	14	41	28	9	46

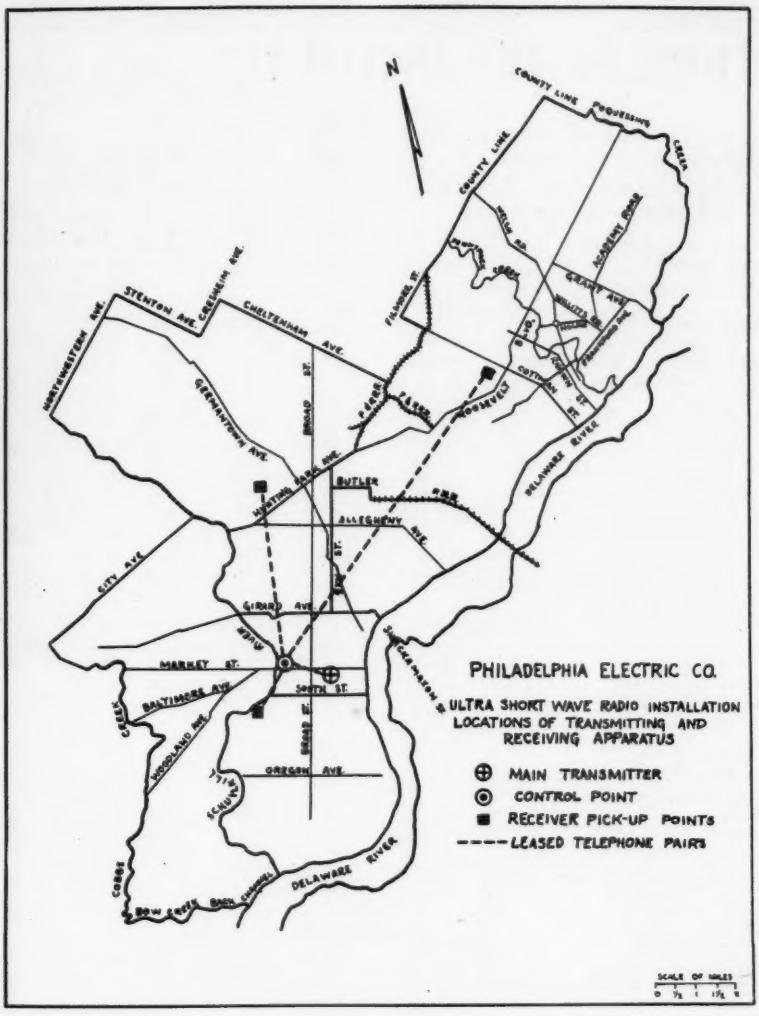


Fig. 5

a probable saving of more than fifteen minutes.

Referring to Table I, other uses for radio such as answering fire alarms, and maintaining street light service in important locations are given. In the two-way conversations, trouble reporting by the mobile unit is included. In these instances outages have been avoided by early reports of pole fires, loose wire, etc.

Table II indicates the type of equipment failures experienced in the operation of the radio system. Car batteries have been a major problem, particularly during the winter months. During the period covered by the above data an extra battery was carried in the mobile units. The two batteries were each 100 ampere hour capacity with a double throw switch provided so that either battery could be used for the radio. Recently, a change to single battery operation has been made and an oversize Bosch generator installed. It is believed that if the automobile engine is run continuously when the driver is with the car and the radio receiver shut off when he is out of earshot, need for additional battery charging will be infrequent.

Receiving sets drifting off frequency has also been a source of trouble. This has been the cause of two outstanding cases of interference involving police systems operating in nearby channels. One of these was corrected when the police purchased a new receiver for their car. The other, involving a receiver at one of the pickup points was cleared by returning the set.

Other difficulties common to radio such as burnt-out tubes, condensers, etc., have been experienced. However, all troubles have averaged less than 1.5 per unit per month for both transmitters and receivers. Eight of the mobile units are in service 24 hours every day. The other mobile units average about 16 hours. In view of this continuous performance the maintenance of the radio equipment does not appear excessive.

The N.F.P.A.

THE National Fire Protection Association was organized in 1896. The purpose of the association is to develop engineering standards for the control of fire and to carry on campaigns of education in fire protection and fire prevention so that loss of life and property from fire may be reduced. The Association has nearly 5000 members scattred throughout the world. Its membership includes public officials, industries, utilities, fire insurance interests, architects and engineers, colleges, libraries, etc.

Most of the members of the Edison Electric Institute are familiar with the N.F.P.A. largely because of its sponsorship of the National Electrical Code, but many of our people may not be aware of the many other activities entered into by the N.F.P.A. and the constructive work that it is doing in all phases of fire control.

Through the N.F.P.A. nearly all of the standards adopted for the control of fire are developed. The Association maintains over 45 technical committees made up of the best experts in the country in their respective fields. The Edison Electric Institute is represented directly not only upon the Electrical Committee which prepares the National Electrical Code, but on the Air Conditioning Committee, the Dust Explosion Hazards Committee, the Electrical Field Service Committee, the Committee for Drafting a Model Electrical Law, and the Committee on Protection of Records.

Other N.F.P.A. committees of special interest to the electrical industry are the Committees on Aviation, Building Construction, Electric Railway Car Houses and Cars, Farm Fire Protection, Fumigation Hazards, Flammable Liquids, Manufacturing Hazards, Piers and Wharves, Signaling Systems and Thermostats, Static Electricity, Trailers and Trailer Camps, and Truck Transportation. The N.F.P.A. carries on many other activities in addition to its standard-making work. Through its special electrical field engineer, whose work is supported by the Edison Electric Institute among others, it maintains a steady campaign for the recognition and

(*Continued on page* 605)

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Residential Rate Reductions Since 1935 by Companies and Municipal Systems

THE average monthly bills shown in Table I have been prepared from the various Rate Surveys of the Federal Power Commission. The comparisons are made on the basis of simple arithmetical averages and reflect prices charged in the 21,361 communities covered by the latest report. Privately owned electric utilities submitted schedules for 18,249 places, and municipal systems, 2112. As in earlier reports, the 1939 Rate Survey did not include communities of less than 250 inhabitants. There are about 22,000 such places served by companies and some 100 served by municipally operated plants.

Communities served by the TVA and some groups of places supplied by Western irrigation districts are included in the category of municipal plants. The inclusion of these, and the exclusion of municipal plants in the places of less than 250 people, tend to reduce to some degree the average rates shown for municipals.

The figures emphasize the fact that, in 1939, for the United States as a whole, the average prices charged by companies for all current in excess of 15 kwhr per month were less than those charged by municipals, whereas in 1935, the dividing point was about 38 kwhr per month.

TABLE I—AVERAGE MONTHLY BILLS FOR RESIDENTIAL ELECTRIC SERVICE IN AVERAGE TOWNS IN THE U. S. A.

MUNICIPAL PLANTS

January First	Minimum Bill	Kwhr per Month 15	25	40	100	150	250	500
1935 ..	...	...	$2.15	$3.21	$5.73	$7.92	$11.00	$19.50
1937 ..	$0.94	$1.25	1.96	2.89	5.19	...	9.81	16.93
1938 ..	0.95	1.24	1.91	2.83	5.03	...	9.41	16.01
1939 ..	0.96	1.22	1.83	2.69	4.85	...	8.97	14.98

COMPANIES

1935 ..	...	...	$2.23	$3.20	$5.47	$7.10	$9.38	$14.02
1937 ..	...	$1.30	1.96	2.82	4.98	...	8.55	12.25
1938 ..	$1.00	1.26	1.90	2.74	4.88	...	8.40	11.93
1939 ..	0.99	1.22	1.82	2.63	4.76	...	8.25	11.64

The figures in Table II show the percentage changes in rates for private companies and public plants for monthly uses of 25 to 500 kwhr between January 1, 1935, and January 1, 1937; between January 1, 1937, and January 1, 1938; and between January 1, 1938, and January 1, 1939. Conforming to the long-term trend the figures shown all represent *decreases*.

TABLE II

Kwhr per Month	Municipal Systems 1935-1937	1937-1938	1938-1939	Companies 1935-1937	1937-1938	1938-1939
15	...	0.8%	1.6%	...	3.1%	2.4%
25	8.8%	2.6	4.2	12.1	3.1	4.2
40	10.0	2.1	4.9	11.9	2.8	4.0
100	9.4	3.1	3.6	9.0	2.0	2.5
250	10.8	4.1	4.7	8.8	1.8	1.8
500	13.2	5.4	6.4	12.6	2.6	1.0

It is apparent that municipal plants are emphasizing reductions in the upper brackets of use, while companies are making the largest proportional reductions in the lower brackets. These figures, of course, represent averages for the U.S.A.

The N.F.P.A.

(*Continued from page* 603)

adoption of the various editions of the National Electrical Code. The association also maintains other general field engineers who visit cities throughout the country working with city officials, Chambers of Commerce, and others, to bring about a recognition of specific local fire problems and how they may be corrected. The field service activity has been carried on continuously since it was established in 1924 and thousands of contacts have been made with all important cities throughout the country.

Within the association is an association of fire marshals which includes all of the state, provincial and city fire marshals of the country. These men are the enforcing officers for fire protection and prevention legislation. The success of the N.F.P.A. in campaigns for model legislation such as the model arson law and the model fireworks law is due to its close contact with the fire marshals.

The Fire Record Department of the N.F.P.A. maintains extensive records of all sorts of fires and the association's Executive Office serves as a clearing house for world-wide information on every phase of fire protection and prevention. The association publishes a quarterly magazine for its members and many pamphlets on special phases of fire protection.

While many utility men are members of the N.F.P.A., there are many utility companies that do not have even a single membership in the association, and the purpose of this little story is to call their attention to the importance of this organization and the value of its work directly to them. Dues for associate membership in the N.F.P.A. are $10 a year and each member receives all of the literature that the association issues and is entitled to its consulting service. The Executive Office of the association is at 60 Batterymarch Street, Boston, Mass. Information about the association and its work will be gladly sent to anyone interested.

New Farm Booklet

A NEW booklet, "Farm Help From the High Line," has been issued by Westinghouse Electric & Manufacturing Co. as the main point of a dealer program pointed toward the large farm market. The booklet, among other things, shows how rural electric users have achieved substantial savings through wider use of service.

Bibliography on Commercial Electric Cooking

1933-1939 Inclusive—Listed in Chronological Order

THIS bibliography of material, published during the past seven years, was prepared by the Commercial Electric Cooking Council to aid the many utility companies that realize and are beginning to investigate the profit possibilities of the commercial electric cooking load. (An earlier bibliography appeared in the February, 1934, E. E. I. BULLETIN.)

The increased acceptance and importance of this market is reflected in the number of articles and space devoted to it by the trade press during the past year.

The Council is ready to be of assistance in the development of this market and to aid in the solution of problems resulting from it and therefore welcomes inquiries.

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Council Publicity

"Electric Cooking Booklet," Soda Fountain, March, 1939, p. 63.
"Electric Cooking," Liquor Store and Dispenser, March, 1939, p. 10.
"New Booklets to Help You Sell," Electrical Merchandising, March, 1939, p. 49.
"Electric Cooking Booklet," American Restaurant Magazine, April, 1939.
"Booklet Shows Low Cost of Electric Cooking," Air Conditioning & Refrigeration News, April 5, 1939, p. 11.
"National Council Promotes Monthly Cooking Bulletin," P. U. A. A. Bulletin, May, 1939, p. 4.
"Cookery Profits," Electric Light & Power, May, 1939, p. 88.
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"Cash Awards For Sales Methods on Electric Counter Cooking," Air Conditioning & Refrigeration News, Aug. 30, 1939.

Council Publications

"Build Profits with Electric Counter Cooking," issued Monthly for Commercial Electric Cooking Council, 420 Lexington Ave., New York, N. Y.
"Survey of Sales Commercial Electric Cooking Equipment," year 1938.

Company Publications

"Edison Commercial News," issued regularly by Commonwealth Edison Company. (Includes some commercial electric cooking articles.)
"Edison Life," issued regularly by Boston Edison Company. (Includes some commercial electric cooking material.)
"Electric News, for Chef and Baker," issued monthly by Hartford Electric Light Co.
"Los Angeles Electrical News," issued occasionally by Bureau of Power & Light, Los Angeles, Calif.
"Reddy Kilowatt's Restaurant Review," issued monthly by Portland General Electric Company.
"What's New Among Commercial Users of Electricity," issued monthly by West Penn Power Co. (Includes some commercial electric cooking material.)

Other Publications

"The Electric Chef," published regularly by The Electric Chef, 612 National Building, Seattle, Wash.

PERSONALS

Leo T. Crowley, head of the Federal Deposit Insurance Corporation, was elected Chairman of the Board of Standard Gas and Electric Company this month. Victor Emanuel, present Board Chairman, will become Chairman of the Finance Committee. Prior to Mr. Crowley's acceptance of the Standard Gas and Electric post, Mr. Emanuel issued the following statement:

"The Board of Directors of Standard Gas and Electric Company has conferred with Leo T. Crowley, now Chairman of the Federal Deposit Insurance Corporation, and has asked him to accept a place on the Board of Directors of the company made vacant by the recent death of Benjamin L. Allen, a director.

"It is contemplated that, if Mr. Crowley accepts this place on the Board of Directors, he will become Chairman of the Board of the company and Mr. Emanuel will become Chairman of the Finance Committee. No other changes in the Board of Directors or its executive officers are contemplated. Mr. Crowley has taken the tender under consideration.

"Bernard W. Lynch continues as President of the company."

Mr. Crowley will continue for several months to give precedence to his duties with the Federal Deposit Insurance Corporation.

Felix W. Boldenweck, who has been associated with the Commonwealth Edison Co., Chicago, for 33 years, has been appointed Assistant Manager of Power Sales. He will continue in direct charge of the industrial power service division.

In appreciation of his half-century of service to the utility industry, **Fred H. Sargent,** president and agent of the Lawrence (Mass.) Gas and Electric Company was the guest of 350 employees of that organization and the New England Power Association at a recent banquet. Mr. Sargent began work as a clerk at the company's gas plant, becoming manager of the commercial department in 1895, superintendent of the gas department in 1898 and in 1904 general superintendent of gas and electric departments. In 1919 he was elected agent of the company (corresponding to the general managership in the textile field) and in 1920 became vice-president and a director. He attained his present post in 1927.

George F. Stecker, general superintendent of construction of electric plants and substations for the Consumers Power Company, was honored recently at a company luncheon in Kalamazoo, Mich.. on the completion of fifty consecutive years of service. He was presented with a diamond service pin by Wendell L. Willkie, chairman of the board of the Consumers Power Company and president of Commonwealth and Southern Corp.

Mr. Stecker's latest construction achievement is the new 70,000 kw Bryce E. Morrow station on the Kalamazoo River at Comstock, Mich., dedicated immediately after the luncheon at which Mr. Stecker was honored.

Mr. Stecker became associated with the company in Albion in 1889, three years after its founding by the Michigan electrical pioneers, W. A. Foote and his brother, J. B. Foote. He supervised construction of numerous hydroelectric plants on the AuSable, the Manistee, the Mushegon, the Kalamazoo and other rivers and the construction of several steam-electric plants which form the backbone of the Consumers Power system.

Douglas Dow, who has been connected with the Detroit Edison Company for a number of years, most recently in the stores department, has been named chief of research for that company. to succeed the late Dr. Clarence F. Hirshfeld. Mr. Dow spent four years with the General Electric Company.

Promotion of three veteran executives of New Orleans Public Service, Inc., to vice-presidencies of that company was announced last month by A. B. Paterson, president and general manager. The three, all of whom have been serving as assistants to the president, are **E. S. Myers, H. E. Meade and A. B. McCoard.** L. G. Ireland. another vice-president, continues in the same position.

Paul Hoots, who has been connected with the engineering department, has been appointed assistant to the president.

S. P. Vecker, General Sales Manager of the Carolina Power and Light Company, Raleigh, N. C., since 1935, has been elected a vice president of the company, according to an announcement by L. V. Sutton, President. A graduate of Yale University, Mr. Vecker is a veteran of 27 years' experience in the utility business.

C. V. Dunn, until recently superintendent of the service department of the Kansas City Power and Light Company, has been designated to head a newly created company department for the "technical advice and promotion of new and adequate wiring methods." Mr. Dunn will work in an advisory capacity with all departments under a company program for the betterment of house-wiring practices.

CONVENTIONS AND MEETINGS

JANUARY

12-13 Louisiana Engineering Society, St. Charles Hotel, New Orleans, La.

12-13 Public Utilities Advertising Association, Western Conference, Hotel Cosmopolitan, Denver, Colo.

15-16 Canadian Electrical Association, Seventh Annual Winter Conference, Montreal, Can.

17-19 American Society of Refrigerating Engineers, Cleveland, Ohio.

17-20 American Society of Civil Engineers, New York, N. Y.

18-19 Missouri Valley Electric Association, Power Sales Conference, Continental Hotel, Kansas City, Mo.

22-26 American Institute of Electrical Engineers, New York, N. Y.

22-26 American Society of Heating and Ventilating Engineers, Cleveland, Ohio.

22-26 National Warm Air Heating and Air Conditioning Association, Cleveland, Ohio.

29-30 Iowa Public Utilities Association, Annual Sales and Distribution School, Fort Des Moines Hotel, Des Moines, Iowa.

FEBRUARY

4-5 Transmission and Distribution Committee, E.E.I., Jefferson Hotel, St. Louis, Mo.

4-8 National Electrical Manufacturers Association, New York, N. Y.

5-6 Prime Movers Committee, EEI, Detroit, Mich.

8-9 Accident Prevention Committee, E.E.I., Jefferson Hotel, St. Louis, Mo.

12-13 Electrical Equipment Committee, EEI, Netherlands-Plaza Hotel, Cincinnati, Ohio.

14-16 Meters and Service Committee, E.E.I., Richmond, Va.

MARCH

19-20 Missouri Valley Electric Association, Joint-Rural-Sales Conference, Continental Hotel, Kansas City, Mo.

21-22 Missouri Valley Electric Association, Engineering Conference, Continental Hotel, Kansas City, Mo.

APRIL

17-19 Missouri Association of Public Utilities, Elms Hotel, Excelsior Springs, Mo.

JUNE

3-6 EDISON ELECTRIC INSTITUTE, Atlantic City, N. J.

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